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ABSTRACT

Much of what teachers know about how to teach and how to conceptualize specific academic content is learned from their undergraduate professors. In 1990, California State University, Fullerton, received a grant from the Fund for the Improvement of Postsecondary Education (FIPSE), Project Teach, to improve the quality of instruction which prospective elementary school teachers experience in undergraduate academic coursework. Project Teach has engaged junior and senior faculty from three schools at the University (Human Development and Community Service, Humanities and Social Science, and Natural Science and Mathematics) in a discussion of effective teaching and of the relationship of their own teaching to the preparation of teachers. In this monograph, participants representing such diverse fields as child development, elementary education, health, physical education and recreation, psychology, English, political science, linguistics, anthropology, mathematics, physics, chemistry, and biology explain their views of the teaching process through the use of metaphors and describe teaching strategies found to be effective in their own classes. (LL)

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Those who can't, go into some less significant line of work.

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Those Who Can, Teach

Editors

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California State University, Fullerton
August, 1992

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INTRODUCTION

In 1990, California State University, Fullerton, received funding from the Fund for the Improvement of Postsecondary Education (FIPSE), U.S. Department of Education to improve the quality of instruction which prospective elementary school teachers experience in their undergraduate academic coursework. The work of researchers (especially Lee Shulman at Stanford), led us to believe that much of what teachers learn about how to teach and about how to conceptualize specific academic content is learned from their undergraduate professors. Thus to make important improvements in the preparation of teachers, we must ensure that excellent teaching is modeled for them long before they begin their formal teacher preparation, (which in California, in most cases, is a fifth year of study.)

To achieve this goal, PROJECT TEACH has engaged junior and senior faculty from three schools: Human Development and Community Service, Humanities and Social Science, and Natural Science and Mathematics in the discussion of effective teaching and in the relationship of their own teaching to the preparation of teachers. Faculty participating in the project currently teach, or expect to teach, courses in the multiple subjects waiver program, a package of academic subject coursework which prospective teachers may take to demonstrate broad academic subject area competence.

In the following monograph, the Project Teach participants explain their views of the teaching process through the use of metaphors and describe some teaching strategies that they have found effective in their own classes. Their goal is to give undergraduates the message that THOSE WHO CAN, TEACH; THOSE WHO CAN'T, GO INTO SOME LESS SIGNIFICANT LINE OF WORK.

We hope that the monograph stimulates you to reflect on your own metaphors of teaching and suggests some teaching strategies useful to you in your role as a teaching model for prospective teachers.

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ABOUT TEACHING METAPHORS

Early in Project Teach we were looking for ways in which senior faculty participants could feel comfortable in articulating their teaching philosophy. Most confessed that during their teaching career, an average of nearly 20 years each, they had never had the opportunity, nor perhaps more importantly, the appropriate forum in which they could search deeply into the how's and why's of what they do in the classroom. A precious few were able to describe exactly what they did; and if they were, they were usually unable to put a name to the strategy or methodology they were using. It was near the end of the first year of this two year project that we fortuitously engaged in a "round-robin" discussion of how we had become college professors. It was at that juncture in the project that we had hit at the base of Project Teach and began to learn about our motivations for teaching. Out of these enriched discussions came the notion of clarifying our teaching philosophies by means of teaching metaphors. *The teacher as*...helped most participants to get at the foundational base of the profession of teaching with special reference to the activities which encouraged active learning in their classrooms. The value of these exercises was so enlightening that we used them at the beginning of the second year of the project in helping to socialize and begin to understand the way they teach with a larger number of junior and senior faculty participants. Tony Grasha, Professor of Psychology, University of Cincinnati, leads higher education in using the metaphor in the academic setting. He has stated that his use of metaphors in teaching and learning are outgrowths of his early work on student learning styles, the research for which he has been most recognized. He notes that not only do teachers have metaphors for teaching; also, students have metaphors for learning. The classroom benifits most when the metaphors overlap. Grasha talks about the impact of using metaphors. First, metaphors have a ***COMPACTNESS*** about them; they pack lots of information and meaning into a small space or package. Secondly, metaphors exhibit an ***INEXPRESSABILITY***, the ability to communicate those things which are usually not transmitted orally or written, getting below the surface, hitting at a different level of language. Lastly, Grasha suggests to us that metaphors are particularlly ***VIVID*** and ***POWERFUL*** arousing emotions and things in us which are not often experienced. These characteristics are especially born out when Grasha has students, faculty and an occassional administrator develop three-dimensional models of their metaphors with construction paper, yarn, paint, tape, tinsel, clay, pipe cleaners, etc. Over and above the impact which the metaphor models portray, when done well they stand on their own without explanation. Further, in getting at the function of metaphors, clarity about teaching and learning comes out of adding or subtracting components from the model. So, for the reader, it is your fortune to sit back and learn of teachers as mid-wives, gardeners, bicyclists and conductors. To be sure, some faculty have difficulty in developing a metapor as some of our participants did. Others were concerned that there is more than one metaphor to describe a classroom. One way to look at metaphors is expressed by Judith Ramirez who chose to create a matrix of metaphors all of which demonstrate the sense of how the metaphor(s) can develop into many levels. We have chosen to represent her model here so as not to constrain the reader in confining one's imagination to a single metaphor which you may find unsatisfactory or "leak" as one of our partcipants suggests. Free yourself from the urge to give up on a metaphor before you explore it. Understand that metaphors are imperfect and can only be used to a point, sometimes in context they fall apart--or do they?

TEACHING METAPHORS - Judith Ramirez

A teacher is ...	Students are ...	The classroom is ...	Pedagogy is ...
A reader.	Books to be read, edited, understood, appreciated.*	A comfortable place to read.	Willingness to ask questions, expand one's vocabulary, see the world from new perspectives, and so forth.
A gardener who ... plants seeds of learning. nourishes maturation of growing plants. cuts, prunes, and shapes mature plants. sometimes simply stands back and admires growth arranges/rearranges garden plots so that some plants can enrich or assist the growth of other plants.	Seedlings which need gentle handling and just the right combination of environmental conditions to flourish. Plants reaching maturity which need support and continued nourishment. Potential flowers, trees, vegetables, etc.	A garden in progress.	Cultivating. Finding the right mix of fertilizer, sun, soil, water,etc. to help the garden grow.
A fellow gardener.	Gardeners who are planting seeds, cultivating plants, and taking charge of their own maturation. "... who could argue that a garden of daisies and hollyhocks was more developed than a garden of artichokes and asparagus? Who could claim that a garden with a great variety of flowers was more inclusive and therefore more highly evolved than one that contains only roses? All gardens, of course, must be cultivated if they are to grow, but each one comes to maturity in its own time, in its own way." **	A place where many gardens can grow and sustain each other's growth cooperatively.	Determining what needs to be done to enhance each garden's development. Since all are gardeners, all must be involved in these decisions. What is best for one garden may not be for others.
An artist who ... communicates ideas and emotions on a canvas.	Paints and various materials whose value is often discovered or enhanced only in combination with other materials.	The artist's studio.	Finding the right tools and materials to create works which commu-nicate effectively and aesthetically.
An aesthetic facilitator.	Artists, storytellers, or other creators searching for ways to communicate their ideas, experiences, understandings, questions, and so forth.	A studio for artists.	Providing space, materials, tools, and insights to enable students to discover, communicate, share, explore, and so forth.
A gourmet chef who ... combines the right ingredients to create a culinary masterpiece.	Main ingredients in the chef's creations.	The kitchen in which the masterpiece is prepared and the dining room in which it is served	Cooking. Preparing the ingredients (e.g. dicing, browning, blending together) for the masterpiece. Finding just the right mix of herbs, spices, wine, etc. to enhance the meal.

*Idea adapted from Islas, Arturo (1984). *The Rain God.* NY, Avon Books, p.26.

**Anderson, Sherry (Spring 1992). "Leaving Home." *Noetic Sciences Review.* p. 8.

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TEACHING METAPHOR: TEACHER AS A MIDWIFE

The etymology of "educate" is the Latin educare, meaning "to pull out" or "bring up."

Teaching is too complex to capture in a single metaphor, but I'll choose one: Teacher as Midwife, one who guides and draws life out, who helps give birth.

The student (like the delivering mother) is a *creator*. As a teacher I don't feel ownership over students' ideas; their knowledge is their own, and my job is to help them give birth to insights and pull their implicit knowledge and values to conscious life. Nor do I feel responsible for their ideas. Their knowledge is their baby--they create it and, with my help, push it out.

Like delivering a baby, learning is *messy*; genuine understanding doesn't come in tidy packages. As delivering a baby *takes time*, with many starts, stops and false alarms, learning doesn't occur in a preordained linear sequence--there are digressions, retreats, missteps.

The midwife-mother and teacher-student relationships are both *reciprocal*, *dynamic*, and *very intimate*. The midwife-mother relationship is *active*, with spurts of effort and progress between consolidating pauses. As a midwife knows when to stay in the background and when to prompt a push, the teacher knows when to encourage, exhort, and reward. A midwife and teacher are also *supportive*. As the mother's emotional response is inextricably linked to the physical procedure of birth, so is the student's affect inseparable from the intellectual experience of learning.

As the midwife recognizes the mother as an *individual*, the teacher sees the student as unique; as no two births are alike, no two students are. And as a midwife's *repertoire grows* with each birth, so does the teacher's bag of professional tools with each student and class. Finally, as the midwife's job is completed, the mother's *powerful feelings* are similar to the student's at semester's end: fatigue, relief, joy.

TEACHING STRATEGIES

I will focus here on the topic of "**active learning**," my understanding of which has been greatly enriched and refined by Project Teach.

Despite the fact that I do a good amount of lecturing (and my students therefore do a good amount of listening), I try to design my courses to allow students to do more than just listen. I don't want students to merely receive knowledge, as if their minds were passive sponges or empty bottles, but to actively think about course content. I also want students to reflect on their behavior as students; I strive to make students more conscious of themselves as learners and thinkers. As a result, I hope students' self-concepts as epistemological beings evolve from that of a receiver of knowledge, of student-qua-receptacle, to that of a analytic producer of knowledge and ideas, of student-qua-creator.

To achieve these general goals, I use some methods and strategies that I have learned from Project Teach. Other techniques include those I have considered in the past but because of inspiration from Project Teach have finally put to use in my courses.

To encourage active learning in class I have students reflect on their own learning. One such strategy I have used is the "**One-minute paper**," in which I ask students, at the end of class, to write brief answers to two questions: What is the major idea that you got from today's class?, and What is a major confusion or question that you have about today's material? Students respond positively to this opportunity to think about their learning, and they typically offer insightful, analytic comments, especially about their confusion on a topic. In subsequent classes I try to clarify the most common confusions by addressing them directly or asking students to briefly explain to classmates their own understanding of the topic.

Another method I use in class to actively engage students during lectures is the "**Skeleton Outline**," a technique I learned from Project Teach to help students improve note-taking and comprehension of material. Early in the semester, I include substantial categories and information on the outlines; there is a good amount of "flesh" on the skeleton. In ensuing classes, however, I gradually reduce the amount of material in the outline, thereby making it more skeletal, and make the students take a more active role in completing the outline. I wean the students off material I give to them to make them more active in grasping the material. Students must determine how to organize the material presented in class and judge what material is most important.

To encourage active learning in class, I encourage frequent **class discussion**. I try to avoid simple-minded "yes/no" questions, as they reinforce a misguided emphasis on the "quick right answer" and the product of learning. I try to cultivate the process of learning, which calls for thoughtful discussion that respects thinking. I ask provocative questions and encourage ongoing discussion. This requires substantial "wait time," as well as probing of students to explain their views. When I discuss such issues and tactics (e.g., wait time, process vs. product), students see their relevance to their careers as future teachers.

To explicitly prompt students to analyze their learning, I give them **surveys on their studying and exam-taking**. Immediately after exams, I give students surveys that require them to rate their own behaviors (e.g., good attendance, participating in class, note taking, doing assigned reading, studying with classmates, etc.). Students seem honest in describing their study behavior (surveys are anonymous, although many students nevertheless put their names on them) , and when I return exams I provide feedback on self-reported study habits and relate class performance on the exam to their study and in-class habits, allowing students to identify areas for improvement in their behavior.

I also use a variety of active learning methods outside of class. A simple one that has been discussed in Project Teach is the **Response Paper**, a brief (2-4 paragraph) essay in response to questions I provide on assigned reading. Rather than ask for right/wrong, technical knowledge, I ask questions that help students "connect" the scientific material to their personal experience and views. For example, for a chapter on child-rearing styles, I would ask students to analyze how their parents raised them and to classify their parents into the categories discussed in the text.

Other ways to engage students actively and directly with course content is to have them **conduct interviews and observations** of children. Students conduct these as part of their project, and later describe and analyze in a paper or class presentation. **Class presentations** make students active rather than passive participants in their education. Presentations are also valuable because they help students appreciate that they can be constructors, rather than merely recipients, of knowledge. By conducting interviews or observations of children, students get out of the text and classroom and into naturalistic settings (playgrounds, schools) where they can learn about children by observing or interacting with them. Students literally become more active creators of knowledge.

All of the strategies I have described are designed to make students more active in and out of the classroom. I use them because, in short, I believe active learning fosters more authentic and lasting learning. Also, active learning respects the student as an important participant in the learning process. My notion of teaching is inspired, in part, by the etymology of the word "educate." Its roots are the Latin "educare," which means, roughly, "to pull out." Active learning techniques are effective teaching tools because they are ideal for pulling out of students their knowledge and experience.

Because many of my students aspire to be teachers in the future, it may be easy to fall prey to the common notion that students naturally appreciate the logic and pedagogical objectives that underlie my teaching. It is my responsibility, one that is enhanced by the fact that many of my students will be teachers, to *make explicit the rationale behind my teaching methods*. Students need--and deserve--to have our objectives and philosophies explained, not only on the first page of the syllabus, where they are quickly left behind, but throughout the course. I discuss my reasons for these requirements as I assign them. In this way students are constantly reminded of their role as students, of my role as their teacher, and the lessons they might draw about both that will help them in their careers as educators.

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TEACHING METAPHOR: TEACHER AS A PARENT

At the outset, I would like to say that I have yet to find a metaphor that completely reflects teaching as I see it. My endeavors as a teacher are similar to the undertakings of individuals in many other kinds of occupations or roles - midwife, counselor, scientist, farmer, minister, mentor, psychologist, to name a few. However, when the comparison is fully examined, I have yet to find a metaphor that captures my view of teaching without some distortion or other shortcoming that misrepresents my perspective.

Given this disclaimer, my current metaphor for teaching is teacher as parent. Diana Baumrind, well-known researcher on parenting, writes of the authoritative parenting style in which parents hold the view that they and their child have reciprocal rights, yet they set firm guidelines and high standards of excellence for their child. They explain their rules and standards, and they listen to their child's point of view. They encourage uniqueness and independence in their child.

I believe this metaphor represents many significant components of teaching as I currently view it. First, because I have relatively small classes (35 or less) , I do view teaching as a personal relationship. In fact, to teach effectively, I need to know what a student already knows, what he/she doesn't know, and what he/she wants to learn. Then I have a better idea about how to create or support a desire to learn and at what level to begin instruction. Reciprocity is also a key element; while I have a responsibility to prepare myself for teaching, students also have a responsibility to prepare themselves for learning. Learning is an active, interactive, and constructive process. Just as parents can learn much from their children, I find that listening to the perspectives and experiences of students enlightens my thinking about or understanding a concept. Finally, I think effective teaching does entail setting and firmly communicating firm guidelines and high standards of excellence. My course goals, assignments, and grading criteria are as explicit and challenging as I can make them. I have high hopes and expectations of my students; the work they do when they leave CSU Fullerton will be instrumental in shaping the future of our (global) community.

The natural extension of this metaphor is that students are like children. While I certainly do not view students as "guileless and unsophisticated" persons (per dictionary), I often wish that more students had the openness and intrinsic motivation to learn and explore exhibited by many children.

TEACHING STRATEGIES

In general my model for instruction over the past few years has shifted to one of giving students more opportunities to discuss their understanding of and reactions to the discipline - with each other, with me, and in a self reflective way. My primary focus is to support the active engagement of students with the discipline of child development; some examples of my attempts to encourage active engagement are through assessment of student attitudes, opinions, and beliefs, assessment of student knowledge, and through "doing the discipline."

Student classroom Assessment Prior to Instruction. At the university level, students come to us with several years of life experience and education - they are not blank slates waiting for information to be scribed upon them. This is especially true in my discipline, child development. Many students come to the class with opinions and beliefs about children's development and/or factors influencing development that conflict with research findings. As one example, many students believe that dyslexia (unexplained difficulty with reading) results from visual spatial processing problems, although many lines of research suggest that visual spatial processing ability does not differentiate dyslexics from normal readers. I have come to realize that acknowledging these beliefs and assumptions is an important first step in discusing topics such as these. By acknowledging these private theories prior to discussing the research topic, we can then discuss what kind of evidence would be required to test these private theories and frame our study of the subject to address such evidence. In addition, recognizing these discrepancies between private theories and research findings can serve to increase student motivation to learn.

Thus, one major change in my teaching strategy has been to utilize student classroom assessment prior to presentation of material, rather than just afterwards. I have incorporated several kinds of activities to assess student's beliefs, assumptions, knowledge, etc.: in-class focused free-writing assignments (individual students, 3 to 5 minutes), small group discussions (4 to 5 students, approximately 5 minutes), written homework assignments with pre-reading questions, brainstorming about the topic with the entire class, "pretests," etc.

I discuss my use of pre-instructional assessments with the students in the course in terms of Piagetian and information processing theories and in terms of what to look for in elementary schools. Frequent assessment, including assessment prior to instructions as well as during and after, is a must - knowledge is a constructive process, and what we said or think we said is not what is necessarily understood.

Doing the Discipline. One way to engage students in the learning process is to give them an opportunity to see how knowledge in the discipline is constructed. Dr. Patricia Szeszulski and I collaborated in constructing a comprehensive interview project for students in our spring 1992 Middle Childhood courses. In addition to our goal of exposing students to the process of how knowledge is constructed in our field, we also wanted to encourage them to consider how gender influences children's development and to observe how younger children's responses differed from older children's responses.

Each student interviewed four children (younger/older male, younger/older female) using a set of interviews Dr. Szeszulski and I had constructed. The interviews related to physical, cognitive, social, and emotional developmental issues. Each student in the class then took responsibility for analyzing all the data collected by students in the class for one page of the interview project. The students also prepared tables for distribution to their classmates and discussed the results of their page in a 10-minute presentation when the related material was discussed on the course. In two subsequent assignments, students integrated results across a number of interview pages.

While I am certain I will modify the project when I teach the course, my perception is that most students enjoyed the structured interaction with the children and the subsequent analysis of the data resulting from the interviews. Many students have spontaneously commented that they have a better understanding of where the information in their texts comes from, and that they enjoyed the research enterprise. I am also confident that students in this course have a clearer understanding about the importance of considering gender and, hopefully, other "subject variables" when reading about research findings; some of our most surprising and interesting findings resulted from the analysis of the data by gender.

In addition to sensitizing students to differences in socialization, daily experiences, etc., between boys and girls and how these may be played out in elementary school, we have also touched on the difference in the level of understanding that results from talking about material to be learned or watching the material demonstrated and actually "doing it" ("Would you rather have your brain tumor removed by someone who has performed the procedure 100 times or watched the procedure performed 100 times?"). We have also related the project to current educational practices in the elementary school (increased use of manipulatives, portfolios, cooperative group work, etc., decreased use of worksheets).

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TEACHING METAPHOR:
TEACHER AS A SKYDIVING TEAM TRAINER

As a teacher, I am similar to the leader of a "for-hire" sky diving team. Central to this analogy is the sense thrill which accompanies action under uncertain conditions where the stakes are high and joint effort toward goals is requisite. There are similarities too.

I am a leader; I have rich experience with this sort of work. I have been paid by others and I am morally bound to their aims. Students are also sky divers. They bring their own experience and skills, and our success in the sky does not depend upon their ability to copy my actions but upon their deftness and serious attention to the task.

My team works in dynamic settings; there is a sense of movement and momentum as we travel through time and space. Conditions shift rapidly, and the landscape is recast as our vantage points change.

Our goals are multiple. There is the pattern or product we are hired to create for the patron; we are not free to act separate from the larger society and its goals. There are also the aims we define together as members of a team with a history and a shared sense of commitment. Individual team members espouse their own goals too.

Our excursions lead us to construe the world and its events in unique, highly personal ways; we teach, learn, and jump together within certain contexts, but ultimately each jumper derives a unique understanding of our experiences.

Teaching and learning are like jumping out of an airplane because the stakes are high. At the heart of both teaching and learning is risk; in any significant endeavor, our very beings--our bodies and souls--are involved, and the risk of censure and failure is counter balanced by the magnitude of our success.

TEACHING STRATEGIES

Participation in Project Teach has reaffirmed my understanding of teaching not as a process of transmission but as an act which supports students as they build their own knowledge and commitments as members of an inquiring community. I have implemented several strategies from Project Teach, all toward the aim of guiding students toward new or deeper understandings of, in my case, the educational realm.

Metaphors

First, just as Project Teach members developed metaphors for teaching and learning, so did my elementary student teachers. In order to help students give form to their implicit notions of schooling, I asked them to develop metaphors as an ungraded in-class assignment.

The richness of this twenty minute task surprised us all. Students' metaphors highlighted the difficulty and importance of the teaching task. For instance, one student wrote that being a teacher is like being a fire fighter: "you jump into unknown situations, you need to know when and how to take control --and when to stand back and watch, and you must remain ever alert for unexpected situations." Another suggested that, in some ways, teaching is like a bouncing ball: "every ball is different, so it's difficult to guide achievement, and the person throwing the ball must change behavior in response to the actions of the ball." Their metaphors also underscored the moral dimensions of teaching. Laurie saw that "A teacher is a mirror. Teachers model the ethical standards, love, dedication, and responsibility we want to see in our students. When teachers are successful mirrors, the students have been able to see their best selves in us."

While, by using metaphor, we run the risk of allowing students to substitute known phenomena for complex, unknown ones, I found that using metaphor as an initial exercise helped students to build bridges between their experiences and their systematic study of the teaching enterprise. Our future efforts to understand the history and differential conceptualizations of schooling were enriched by our personal metaphors. And, finally, as students composed their philosophies of education, they drew upon their metaphors to explore their notions of teaching and learning, and they refined their conceptions and images of teaching in a reciprocal process.

Concept Maps

A second strategy, akin to metaphor, which I implemented as a result of Project Teach involved "concept mappings." During second semester, my "metaphor student teachers" and I studied science education. We again began our course by exploring the images and understandings we already held of the domain. But this time, instead of asking students to compose metaphors, I asked them to list the components of science education and then to draw diagrams of these components. This assignment, though nongraded, seems to have been different enough from the standard educational fare to cause some of the students difficulty.

Despite students' mild misgivings, these diagrams provided me with welcome--and unanticipated--diagnostic information about students' knowledge and affect regarding science education. The maps indicated that students' schema (used loosely here) were both of limited differentiation and integration. That is, students did not perceive many critical components of science education, and those components were not related into coherent "wholes." Concepts seemed scattered, and the scientific enterprise appeared as separate from teachers and students, encapsulated in "the scientific method."

As a result of the information afforded by these maps, I modified my instruction. I attempted to show students the context of science within the larger community and society, and we studied the processes and attitudes inherent in the work of science. On the last day of our course, I handed the diagrams back to the students and asked them to draw a new set, suggesting that they were free to incorporate or reject their first drawings. While many students simply appended their original versions, most constructed entirely new ones. These new diagrams were strikingly similar to each other in a number of ways. Science was no longer set in a discrete box; it surrounded the teacher and the students. Some students drew large "clouds" around classroom participants to illustrate their understanding that teachers and students work together at a certain point in time within specific communities; knowledge was no longer outside human experience.

I also witnessed some changes in students' attitudes toward the subject matter through their diagrams. Jody, for instance, drew the universe at the top of the ladder. The teacher's role, for Jody, is to steady the ladder for students who use the process skills of science to apprehend their world. Steve's map indicated a similar shift. His initial diagram resembled a complicated flow chart of discrete elements. However, his final map showed a teacher and student pouring over a treasure map, where X marked the spot, a large, glittering chest labelled "science". To me, this diagram illustrates a view which upholds the shared nature of exploration and the thrill of discovery.

In sum, the maps were invaluable to me as an instructor. They allowed me to glimpse my students' initial formulations of science education, to adjust my instruction to reflect their current states of knowledge, and in the end, the maps allowed me to witness outcomes of a very different sort than those which may have been afforded by a multiple choice final examination.

The impact on students?

These two strategies from Project Teach helped me work toward my goals of aiding students as they constructed their own knowledge of teaching. I am hopeful and optimistic that the students from my class will consider similar strategies (and classroom observations have supported that optimism). I believe that my students, having seen me wholeheartedly model such strategies and goals, will enrich their own practice as elementary school teachers by upholding their young pupils' struggles to understand and influence the world.

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TEACHING METAPHOR
TEACHER AS A FARMER

Project Teach has devoted some time in discussing various metaphors for teaching. At the risk of appearing pedantic, I must admit that I find this exercise somewhat superfluous. By this statement, I do not intend to minimize the value of explicating one's metaphor for teaching; indeed, psychological research supports the idea that invoking metaphors can be a very useful heuristic for furthering learning and reflective insights by tacitly exploring similarities and differences between the two domains under comparison. From my perspective, selecting a single metaphor to describe one's philosophy of teaching simply cannot adequately capture the complexities and subtleties inherent in explaining a teaching philosophy.

I will concede and offer my own imperfect and not entirely original metaphors! When I first heard someone mention the metaphor of "teacher as gardener" I found myself resonating to this analogy. Perhaps the gardening metaphor was especially appealing for me because it immediately conjured up poetically pleasant images of, "working lovingly with nature in sunny, airy surroundings for the purpose of producing glorious flower beds or bounteous produce!". However, upon greater reflection, I have come to believe that in reality, the act of teaching probably more closely resembles the unglamorous rigors of farming, rather than my idyllic view of gentle gardening! I see several parallels between farming and teaching. First, farming, like teaching, is a labor of love, entailing hard, daily work, and requiring a fair amount of spirited determination and energy in order to succeed well. Second, farming, like teaching, requires a fair amount of planning and preparation, both in the short term (e.g., preparing the soil and deciding when to plant) and in the long term (e.g., planning crop rotations in order not to rob the soil of only certain nutrients over time); likewise, teaching requires a great deal of short term, almost daily attention and preparation, as well as constant ongoing renewal in order to keep courses fresh and invigorating for the long term. Third, the farmer must be active, constantly observant, and in tune not only with the changing conditions of his or her growing plants, but also with larger uncontrollable issues such as weather considerations; in the same manner, teachers too must be actively in touch with the changing developmental needs of individual students in the classroom, all the while taking into account larger, more uncontrollable issues such as budgetary or resource allocations. Fourth, and related to the previous point, in order for the farmer to effectively observe and tend to his or her plants, the farmer must in a real sense possess a whole host of assorted professional skills--such as amateur geologist, scientist, meteorologist, even chemist; effective teachers by the same token, must also draw on a variety of professional skills including those used by a scientist, orator, performing artist, politician, counselor, judge, even lawyer! Fifth, on a more sobering note, in spite of all the best efforts and intentions, farmers occasionally suffer crop losses that are caused by circumstances beyond their control--such as less resilient seedlings, weather calamities, or insect infestations; similarly, teachers must deal with obstacles that are often difficult to manage--such as underprepared students, variations in class size, or budgetary constraints. Sixth, the eventual harvest of the farmer is absolutely vital for the basic survival of the people that the farmer serves. If the crops are healthy and bountiful, the entire community thrives; if the harvest is severely depleted, the entire community will suffer in direct proportion. Likewise, although it sounds almost too maudlin to repeat, the role of teachers in modern societies today is absolutely critical, insofar as teachers play a major role in the education, preparation, and socialization of subsequent generations of its citizens. Finally, I suppose that the parallel I like best is the notion that the farmer shares a very personal and symbiotic relationship to the crops: the crops benefit from the careful nurturing and tending by the farmer, and the farmer reaps the reward of a bumper crop for all of his or her efforts. Thus, a similar relationship exists between students and the instructor--effective teaching facilitates effective learning, and hopefully continues to have positive effects long after the classroom experience itself is over.

TEACHING STRATEGIES

I have implemented a number of teaching and learning strategies in my classes, all intended to facilitate active learning. Although I had already used some of these strategies prior to joining Project Teach, others have either been revised or are new, partly as a result of my participation in this program. The list of strategies I am currently using include: (1) various cooperative learning techniques, (such as "numbered-heads-together," "think-pair-square," team- and class- building, "round robins", etc.,); (2) collaborative learning in the form of a team research project; (3) in-class role-playing exercises and demonstrations; (4) frequent classroom assessments; (5) in-class writing assignments that include personalized free-writes in class, extra credit daily focused journal assignments, and a free-wheeling daily collaborative class narrative; (6) a personalized experiential and interview paper; and (7) use of skeletal outlines for lecture material.

I restrict my comments to discussing only the first of the above strategies regarding my use of cooperative learning structures. I have successfully incorporated cooperative learning structures in my classes as a result of Project Teach seminars. Although on occasions in the past, I had used more informal group discussions in class, I was not fully reaping all of the benefits of a plannned and structured cooperative group interaction. In particular, I found that engaging students early on in several team-building and class-building activities such as grouping by similarities (e.g., geographical location of home, favorite hobby, favorite class, etc.,) on the first day of class was extraordinarily effective both in building rapport among students and with me. Every single student responded enthusiastically and very positively to these "first day" activities; for example, many wrote that: they had never had the opportunity to get to really meet or talk with many students in their classes; that they were able to more easily form study groups or find a partner for their team project; or that these activities made them feel welcomed, more connected, and less apprehensive about speaking up in class since they now knew more people.

I have also used the "numbered-heads-together" cooperative structure to introduce new class material, as well as to review old material covered in lecture. In this method, students formed groups of five, numbered off, then discussed questions (for example, involving scientific methodology) that I had prepared for them and handed out ahead of time. Time was provided for groups to work on each question before I randomly called on one member of each group to respond to that question before the entire class. Only one student out of both of my classes wrote that they preferred a lecture format for learning class material. All of the remaining students commented on: how much more involved and active they felt; that they felt peer pressure forced them to be more responsible for reading, preparing, and interacting in their group; that they didn't feel as shy participating in class when they knew everyone was required to respond during some point in class; that they were surprised at how much they knew collectively as a group; that they felt they really understood the material for the first time, despite having been exposed to it in a prior class; that this may have improved their exam performance and interest in the material being covered; that they had fun and that the class session flew by! The only negative comments were that, at least for presentation of new material, this procedure appeared to take up more class time, and that occasionally, one student in a group might not invest as much energy or preparation as others in that group would've liked to see.

"Think-Pair-Square" is another cooperative structure in which four students got together, discussed a topic or question in pairs, then shared with everyone in the group. I also asked each group to summarize and present their ideas to the class at large as well. Students comments also indicated that they found this exercise similarly very useful, interesting, and invigorating for discussing complex issues and mastering material.

To close on an even more optimistic note, I wanted to relate an episode that took place in one of my classes recently. Only a few weeks ago, one student spontaneously chimed up in one of my classes, "Where **do** you get all your neat ideas for different ways to teach?" Since I had previously spoken to students about my involvement with Project Teach on the first day of class, and about my department's and school's philosophy regarding teaching, this question easily led to a nice class discussion of the purposes of Project Teach and my participation in this program.

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TEACHING METAPHOR

Not tending to think in terms of metaphors, I have not found one that I feel works for me as a general teaching metaphor. Here, however, are partially developed metaphors that I find useful for looking at teachers, students, classrooms, or pedagogy in some situations, for some purposes, and so forth.

TEACHING STRATEGIES

The multiple subjects waiver class I sometimes teach is CHILD 325, Middle Childhood. An on-going concern of the faculty teaching this class has been how to include content about socio-cultural influences on development in ways which increase prospective teachers' awareness and appreciation of cultural differences. When traditional approaches are used, such as lecturing about socio-cultural differences or discussing textbook materials with reference to the limitations of current literature in the field, many students from the dominant culture express skepticism about or resentment toward what they perceive as a diversion from the study of "real development," or describe African-American, Asian-American, and Mexican-American children and families in terms of stereotypes which the faculty and other students, especially those from underrepresented groups, find shallow and offensive.

As a result of my participation in Project Teach, I decided to try designing this class in ways which I hoped would engage students both cognitively and effectively in exploring socio-cultural influences on development. I assigned the students in my section (a total of 26 females; five of whom were second or third generation Mexican-Americans, one of whom was an immigrant from Sri Lanka, one of whom was an immigrant from Colombia, and 19 of whom were Anglo-American) to read the following three examples of what I call "ethnic literature," in addition to a standard child development textbook:

a. *I Know Why the Caged Bird Sings*, by Maya Angelou, an autobiography of an African-American female growing up in the southern United States.
b. *Hunger of Memory*, by Richard Rodriguez, an autobiography of a Mexican-American male growing up California.
c. *The Joy Luck Club*, by Amy Tan, a collection of vignettes about the lives of four Chinese women born in pre-1949 China and the lives of their American-born daughters in California.

My classroom procedure was to give students about a month to read and keep a dialectical journal for each book. As described in the course syllabus, a dialectical journal is "a way for students to get involved with and find meaning in a text -- a novel, play, poem, or any type of literature -- ....'dialectical' from the word *dialectic* meaning the art of practice of logical discussion as a means of critically examining the truth of a theory or opinion." The required format for journal entries is shown and described below:

Left-hand page	**Right-hand page**
Quote and page number	Response
Sentence, paragraph, incident that jumps out at you, sticks in your mind, relates to something in your text or our class discussions, or seems particularly poignant or distressing.	Why you chose this quote--emotional or intellectual reaction, question or hypothesis, connection to own experience, course content or readings, relation to life, interpretation, insight, judgment.

About every four weeks, we took most of our three-hour class session to discuss one of the ethnic literature samples, using the following discussion exercises:

A. Exercise for *I Know Why the Caged Bird Sings*, by Maya Angelou
Directions: Working with three or four other students, reflect on your journal entries and complete each section below.
Part I. What two ideas, theories, "facts", or learnings about child development does your group believe Angelou's autobiography best illustrate? Explain your answers.
Part II. What important questions about developmental theories, influences, or research are raised by, or left unanswered by, Angelou's life story?

B. Exercises for *Hunger of Memory*, by Richard Rodriguez
Directions: First, take about 10 minutes to answer the questions below. Then find at least two other people whose

experience with language was *different from* your own and discuss your a answers. Spend most of your time discussing part d.

Part I. Experiences with language differences

a. Think about your own experiences in comparison to those of Rodriguez. As a child, were you ever in a situation where others were speaking a language different from yours? _____Yes _____No

b. Make notes to compare your experience to his with respect to the following: 1) thoughts; 2) feelings; 3) actions.

c. Think about the actions ot others (adults or children) in the situation and make notes about similarities or differences with respect to the following: 1) things others did that helped Richard cope; 2) things others did that helped you cope; 3) things others did that made the situation more difficult for Richard; and 4) things others did that made the situation more difficult for you.

d. What are the implications of what you have noted above for what you will do as a teacher when working with limited-English-speaking (LES) or non-English-speaking (NES) children? (Use back of page if needed.)

Part II. Spiritual or religious "training"

a. As a child, did you go to a church, mosque, synagogue, or other spiritual center regularly? _____Yes _____No

b. If yes, make notes of important similarities between what you recall and what Rodriguez conveyed about the following: 1) frequency of attendance; 2) person(s) accompanying attendee; 3) thoughts about the experience; 4) feelings about the experience; and 5) actions taken with regard to the spiritual or religious "training" received.

c. How much do you know about various religions or approaches to religious or spiritual "training"?

d. Implications of the above for how you will behave as a teacher insofar as children's religious or spiritual "training" is concerned.

Value of strategies to elementary school teaching

a. Readings

Using ethnic literature gives college students an opportunity to see childhood through the eyes of children who differ from themselves in race, gender, ethnicity, and/or social class.

b. Dialectical journal

Keeping a journal gives college students opportunities to reflect on relationships between their in- and out-of-class experiences and to express themselves in writing.

c. Structured small- and large-group discussion activities.
Structured discussion activities give college students opportunities to share experiences, opinions, and learnings with their peers and to hear multiple perspectives on single events.

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TEACHING METAPHOR: TEACHER AS AN ORCHESTRA CONDUCTOR

My metaphor for teaching is that of teacher as conductor of the orchestra; my role is orchestrating or arranging the talents of the the musicians (or students) to strive for virtuoso performance. As conductor, I direct, guide, and encourage the musicians and expose them to a variety of musical styles. They must become proficient at performance of many musical forms; classical, jazz, popular, country, folk, rhythm and blues, soul, gospel, rock, and rap. I would like my musicians to develop technical skills as well as qualities of artistic expression. I strive to engage all of their senses as I conduct, so that they may hear, and see, and feel the music as it comes alive.

My musicians bring a variety of levels of interest and ability, and thus my task is very challenging. To produce harmony, I must coordinate the brass, string, woodwind, and percussion sections, providing opportunities for each group and each individual to contribute to the musical experience. To provide structure, I capture the attention of the audience with the tap of my baton against the podium. I vary the tempo and rhythm of the music in order to provide excitement and variety. I coordinate the roles of the musicians, bringing in each musical instrument or section for solo and group performances. Each instrument makes a unique contribution to the musical piece.

Countless hours of practice and rehearsal precede the final performance; hours in which the musicians study the music and hone their skills. This practice is motivated by the common purpose of enriching the lives of others. The final virtuoso performance is the culmination of my orchestration of the individual talents of many musicians. As I conduct the musicians in their final performance, I experience a sense of awe in the power that results from the blending of many talents.

TEACHING STRATEGIES

My major emphasis in applying the strategies emphasized in Project Teach has been to emphasize active learning in all aspects of my teaching. While I have always been conscious of the need to engage students in the content, my participation in the project has expanded my repertoire of teaching strategies to promote active learning. A second emphasis in applying innovations has been the use of classroom assessment strategies to obtain formative feedback about how students are learning in my classroom. Classroom assessments have enabled me to make on-going adjustments in teaching in order to enhance the clarity of presentations and, ultimately, student learning.

I am convinced that, in order to learn, students must do much more than just listen. Throughout my ten years of teaching at university level I have developed a teaching style that is designed to promote student involvement through reading, writing, discussion, group collaboration, and problem solving. The development of higher order thinking skills of application, analysis, synthesis, and evaluation are critical to the content of teaching methods in physical education. I have found that my students prefer teaching strategies that involve active learning, and they are particularly open to activities in which they can explore their own attitudes and values.

In developing the goals and objectives for my courses, I consider both the student learning outcomes (product objectives) and the nature of the classroom environment (process objectives) that facilitate learning. The following are general goals and student learning processes that I identified for PHED 372, Movement and the Child. (Note: Specific product objectives are not included here).

Goals: Students will have opportunities to-

- ANALYZE the psychomotor needs of children
- EXAMINE evidence of the importance of physical education in elementary grades
- DISCUSS characteristics of quality programs in elementary physical education
- EXPLORE movement concepts and fundamental motor skills that form the basis of curricular content

PARTICIPATE in educational games, dance, and gymnastic experiences in laboratory (on-campus) settings

ENGAGE in "hands-on" practicum experiences with children in a public school setting

EXAMINE the teaching process as it relates to effective teaching in elementary physical education

REFLECT on their own previous experiences as students in elementary physical education

Process Objectives: (classroom environment)

1. Apply theoretical constructs to practical settings through laboratory activities (EXPERIENTIAL LEARNING)
2. Participate in interactive and dynamic classroom activities (ACTIVE LEARNING)
3. Accept perspectives and experiences of all students in the class (DIVERGENT THINKING)
4. Foster an environment of self-directed learning (INDIVIDUAL RESPONSIBILITY)
5. EXPAND LEARNING BEYOND THE CLASSROOM to the clinical laboratory
6. Engage in REFLECTIVE TEACHING AND LEARNING by examining the contextual factors that make classroom settings unique.

A variety of values are implicit in the goals and objectives described previously. These values, which describe the active learning environment that I seek to develop, are as follows:

1. A CLINICALLY-BASED (in the schools), HANDS-ON (working with children) approach to acquiring teaching skills is essential for promoting transfer of training.
2. We learn better by DOING than by simply seeing and hearing.
3. Direct applications of curricular content and teaching methods to public school teaching contexts help prospective teachers to GAIN CONFIDENCE and to apply THEORY INTO PRACTICE.
4. Clinical EXPERIENCES WITH CHILDREN OF DIVERSE CULTURAL BACKGROUNDS help prospective teachers to broaden their repertoires of teaching skills (e.g, using Sheltered English, overcoming language barriers, incorporating activities that reflect cultural diversity).

In incorporating active learning, I have used a variety of teaching strategies including 1) the modified lecture, 2) questioning, 3) discussion, 4) in-class writing, 5) cooperative learning, 6) visually-based instruction, and 7) school-based field work. I typically begin the class with a transparency that outlines my objectives. These objectives serve as a set induction for what will follow, helping students to orient their thinking and abstract critical concepts from the readings and mini-lectures. I tend to deliver short lectures that are punctuated by many questions, opportunities for discussion, cooperative learning activities, and in-class writings. My goal is to deliver the content in a way that is personally meaningful to the students. I would like them to reflect on the content so that they may understand its relevance to their own lives. I am certain that this deep processing of information will lead to greater student learning and increased transfer of theory into practice.

In the process of incorporating both active learning and classroom assessment, I make a concerted effort to identify specific teaching strategies that my students might use in their future teaching. I use the "teachable moment" to explain why I use these particular strategies (for example, providing wait-time when asking questions, outlining objectives at the beginning of the class, or providing closure of important concepts). A goal that pervades all of my classroom teaching is to provide a model of pedagogy that will translate into improved teaching by prospective teachers in my class.

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TEACHING METAPHOR:
TEACHER AS A ZEN MASTER

My metaphor is teacher as Zen Master, student as apprentice. I see learning as a collaborative journey focused on the ultimate goal of enlightenment. The classroom for this journey is the road currently traveled by the Master; a road that is one of many temporary experiences in the life of the apprentice. Although the Zen Master has an acquired wisdom and experience beyond that of the apprentice, the true Zen Master is a lifelong traveler, one who is always becoming rather than one who has become. One who not only shares in, and learns from the experiences of those who travel with him/her, but one who provides guidance, challenge, and the tools necessary to help novice travelers eventually seek their own road. Realizing that apprentices have different skills, abilities, cultural experiences and traveling styles it is incumbent on the Zen Master to find a language which will facilitate effective communication with each. Some apprentices must shoot the arrow in order to understand the meaning of the lesson, while others can merely watch in silence as the Master draws the bow. Still others must be the arrow, the bow, and the target or the meaning of flight is lost. Thus, the journey is not an inactive one, but a series of choreographed challenges designed to help the apprentice master the road's terrain (course content). Whether it be valleys or mountains, meadows or forests, canyons or plains, each must be mastered if the journey is to be meaningful. Eventually the apprentice and the master will part. And in this parting some may seek a path well travelled, while others may venture where there is no road. The selection itself does not matter. For the ultimate goal of the Zen Master is to cultivate within apprentices a lust for travel and the tools to journey on their own.

TEACHING STRATEGIES

Among the many teaching/learning strategies I have been exposed to as a participant in Project Teach, the ones that have made the biggest impact on my teaching are those that have broadened my repertoire of "active learning strategies". As I thought about relating my use of those strategies in written form, I was struck by the strange contradiction posed by trying to relate an "active experience" through an inactive medium. Frustrated by the passive nature learning takes on when it is done through a reading format, I decided that the best way to describe my use of active learning strategies was to involve the reader (as much as possible) in the activity itself. So for the moment, suspend your analytical reading side and perhaps your vision of college teaching and imagine the following:

> *You are walking down the hallway in a building filled with classrooms and all at once you are struck by the noise and commotion emanating from one of the rooms. Curious, you peek your head in the door and see approximately 10 small groups of 3 to 4 students scattered throughout the classroom engaged in animated discussions. At first you are completely surprised that no one has noticed your entrance and cannot imagine what could be so engrossing a topic to prevent even the slightest distraction. Seeing no one at the lectern you are convinced that the instructor has stepped out for a moment and students have merely decided to pass the time with social chit-chat of their own. However, before that thought has the opportunity to jell, you notice an individual moving from group to group, sometimes conversing with the students, sometimes only observing. Periodically, during those transitions, that individual (who you now realize is the teacher) calls out, "O.K., time's up, move to person 3. Remember, two minutes, begin!".*
>
> *The noise level rises again and you decide to eavesdrop on the groups. After listening for some time you begin to see a structure in what first appeared to be organized chaos. You notice that all groups have a three by five card and written upon it is a question that asks students to identify what they think would be one root cause of some particular phenomenon. As you watch, you see each group member take a two minute turn sharing his/her answer, uninterrupted by the remaining group members who occasionally nod or smile as they listen and take notes. After the final two minute time period, the teacher calls out, "O.K., open group discussion, you have 3 minutes, begin!" Again the noise level rises, interrupted only by the next instruction requesting that one person in each group share with the class a root cause identified by their members. "Who wants to go first?"*

As the first individual begins to speak the teacher checks-off one of the "root causes" she has listed on the overhead transparency now being illuminated on a screen. For the next 20 minutes a type of interactive lecture begins to take place. The format for this lecture is always the same: After each group shares their idea, the teacher opens the floor for large group discussion to explore different interpretations, ramifications, and cultural perspectives. Each discussion ends with the teacher summarizing the major points addressed, providing at times, information on specific aspects not previously identified, or a framework that facilitates understanding the cause relative to "the big picture". This process goes on, moving from group to group, until all "causes" listed on the transparency (and identified by students) have been addressed. At the end of this activity; students are instructed to spend the next 5 minutes brainstorming with their groups possible solutions to the problem based on what they know about its causes.

Eventually, the groups begin to share again their solutions with the class in a similar 20 minute round table discussion. During this time you observe a number of things taking place within the classroom environment. To begin with, you notice a tremendous amount of interaction specifically addressing the course content, interaction not only between teacher and student(s), but student to student as well. Moreover, the general tone of the interaction is very positive, cooperative and supportive, seemingly void of the self-consciousness and fear of making mistakes that often causes students to seek the role of "silent observer". Additionally, the quality of the interaction itself not only reflects students' use of critical and creative thinking/problem solving skills, but also the development of them as well. At a more subtle level you sense a type of "classroom community" that is evident in the connections and analogies students make relative to each other's input, in the tolerance and acceptance of differing viewpoints and cultural perspectives that provide each an avenue for discovery and sharing in a voice of their own, and in the playful nature of the "inside jokes" that leave all rocking in laughter. Most of all, you notice in students an energy, enjoyment and motivation for learning, and the willingness to risk ignorance to do so.

Focusing again on the classroom events, you hear the teacher offering a brief closure of the day's topic(s) and instructions for a new activity. In this activity students are asked to take out a sheet of paper and identify in writing those points of the day's lesson that still seem "fuzzy", and those that are as "clear as a bell". "Remember these are not graded. They just give me an idea of how well you're

> *doing and alert me to possible problems you might be having with the content so I can readdress them before we move on to other topics. So, please remember to write your name on these!" Three minutes later the papers are collected and the class dismissed. With surprise on their faces, some students glance at the clock amazed that class time has passed so quickly. Along with the students you shuffle out the door again on your way. When the clock in the hall catches your eye, you chuckle in disbelief at the 75 minutes you spent observing what at first was merely a curious noise.*

Although the above is a fairly accurate description of an actual lesson I taught, it would be misleading to suggest that all my classes turn out this way. However, in the years that I have struggled with creating a more active learning environment in my classroom, whether that be through the use of "experiential learning" (e.g., role playing, structured debate), "cooperative learning" or the "collaborative learning" structure described above, the impact on my students has been quite remarkable. I envision a sense of classroom community vs. singular isolation, replete with rules of discourse and group interaction that not only provide a safe environment for each to discover their own voice, but also facilitate risking to know, share and understand those you learn with. In addition, as a educator of prospective teachers, I am committed to creating and actively modeling techniques and strategies that not only facilitate student achievement but provide a gestalt, if you will, for learning itself. Although my students may not remember every bit of information taught, or the specific details and nuances of a particular method used, they do remember the spirit of my class; a spirit best reflected in the phrase used by popular talk show host, Arsenio Hall, "Let's get busy!"

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TEACHING METAPHOR:
TEACHER AS AN IMPROVISATIONAL/THEATER STAGE MANAGER/DIRECTOR

I like to think of my classroom as an *improvisational theater* where I, as teacher, assume the dual responsibilities of *stage manager* and *director* and my students, as *actors*, select various roles such as protagonist, provocateur, devil's advocate, or "member of the audience" based on his or her individual background, experiences, talents, and motivations. As *stage manager* I contract to produce a particular *play*, or course, that comes with a basic *script*, or course content, and I create a *program*, or syllabus to acquaint the *improvisational company*, or members of the class with the sequence of events. As *director* I am responsible for providing sufficient direction, constructive criticism, and encouragement so that each *actor*, or student, may bring, his or her own voice and perspective to their selected role. Although the *script* provides a basic plot for each *act,* or class day, an *act* can be either predictable or full of surprises depending on each *actor's* preparation and willingness to collaborate to elicit the best possible performance from each other. At the *final curtain*, or conclusion of the course, the merit of the *theatrical event,* or learning experience may be *reviewed*, or evaluated in terms of whether each *actor*, or student, has thrived in his or her selected *role* and perhaps found the courage to try a less familiar more challenging *role*, which may provide greater opportunity for additional personal and professional growth, and if the *improvisational company*, or class has flourished and collectively created a unique and exciting interpretation of the *script* .

TEACHING STRATEGIES

In contrast to many of the participants in Project Teach, who prepare future teachers in a specific discipline, my role in the multiple subjects waiver program is to help future educators understand the physical, cognitive, emotional, and social development of the school-aged child. In addition to presenting specific developmental content, I try to design my course on Middle Childhood so that students will have opportunities to develop thinking and communication skills, and to experience some of the excitement of creating or discovering new knowledge about children's development. I strongly believe that students' active participation is the crucial element in the learning process, and I think my approach to teaching reflects this basic premise.

Classroom Format

I emphasize the social nature of the construction of knowledge and the role of participation in the learning process. I try to model this philosophy by engaging students in discussion and a variety of collaborative activities rather than relying strictly on a lecture format where student's passively record "information".

Get-acquainted activities. I assume that students will be more comfortable engaging in discussions if they know one another so at the beginning of the course I use a number of class-building structures to promote student interaction. One particularly successful "get acquainted" activity is called the Spatial Concepts Formation. For this activity, a physical location in the classroom is identified to represent the location of the University, and students are asked to configure themselves in geographical proximity (north, south, east and west) to the University. After completing the spatial aspect of the exercise, the students are asked to introduce themselves to the people who live in a similar geographical location and to share their route to school and class schedule with the members of the group. The spatial Concepts Formation not only initiates student interaction in the classroom, but a number of students have reported that the activity has facilitated the formation of off-campus study groups and car pools as well.

Collaborative learning activities. I use several techniques to encourage collaborative learning among students in the classroom. One way is to ask students to spend five minutes writing about a difficult concept or issue. After the writing session, students share their ideas with their classmates in small groups or several students read their comments aloud, which provides a catalyst for discussion. A second approach involves having small groups of students work on an assigned "real world" problem that requires integration and application of course materials. Both of these activities permit students to learn from one another and literally "create" knowledge for themselves. I have also found collaborative activities useful for systematic assessment of students' understanding during lectures. One learning structure I frequently use for assessment of comprehension is called "Numbered Heads Together". At the beginning of the semester students are assigned to four-member "support groups" where each member of the group is given an ID number (1-4). After presenting a concept to the class I pose a question to assess current understanding of the issue, and support-group members are instructed "put their head together" to compose a response. After the groups have had an opportunity to confer, a number is randomly selected and the individuals with the selected ID number share their group's response with the class. Most of the students report that the collaborative group discussions permit them to test their understanding of issues in a non-threatening environment, which is of course the point of the assignment. Support group membership is rotated three times during the semester.

Comprehensive Interview Project.

I am convinced that observing behavior and interacting with individuals of different ages, gender, and races/ethnicities is crucial to understanding children's development. Diana Guerin and I modeled collaborative activities to our students by working together to produce a comprehensive term project, which was designed to facilitate understanding of physical, cognitive, social and personality development during middle childhood through direct assessment of children's daily experiences, perceptions, and behaviors. Students were provided with a project manual that included interview procedures, copies of the interview protocol, and detailed data analyses instructions. Each student was required to use the prepared questionnaire to interview four children who varied in age and gender, summarize age and gender variation in the class data for one page of the interview protocol, present the summarized findings to the class, and write a written report integrating the class findings on one developmental domain. The culminating experience for the project involved participation in a collaboration with classmates who specialized in each of the four developmental domains to explore the class data to determine how complex interactions between contextual factors influence children's' lives, and how each domain of development affects other domains. As students discuss the results and/or write empirically based papers they are challenged to think critically about both their methods and their interpretations, to apply theories and empirical findings discussed in the lectures or textbook, and communicate their ideas clearly.

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TEACHING METAPHOR: TEACHER AS A TOOL DISTRIBUTOR

Teaching is a process by which tools are distributed. The learned are the tool distributors and students are the recipients. It is the responsibility of teachers to make the instruments available; it is the responsibility of students to learn about the instruments. Teachers need not teach students everything about a subject. It is more useful to teach the process. By teaching about the tools, students acquire a device to learn on their own.

There is a myriad of instruments available to students. Resources include the library, workshops, conferences, colleagues, networking, and classroom teachers. Just as there is not one tool adequate for all jobs; there is not one resource that provides all information about a subject. Assembling the tools and using them collectively allows the user to view the issue from many different angles. Appropriate use of the tools occurs only when one is willing to study an issue from all sides.

In order for learning to continue through the ages, some students must want to become tool distributors. The process becomes an endless progression of passing tools to one another. Some, who will be called researchers, will learn to hone the instruments to make them more efficient. Others, who will be called administrators, will want to improve tool distribution. Still others, who will be called teachers, will concentrate on tool dispersion. All operations are necessary to keep the learning process functioning optimally. Tools only work when they are used appropriately and cooperatively.

TEACHING STRATEGIES

My participation in Project Teach took place during the 91/92 academic year. The teaching/learning strategy I developed most fully over the course of my involvement was classroom assessment. To some degree, I have employed this method in the past in that my teaching style is interactive with students in the classroom. However, with the assistance of others involved in Project Teach, I believe I made optimal use of the strategy. I heeded the advice of Angelo (1990) from a reading provided to members of the project, "...both faculty and students must become *personally invested* and *actively involved* in the process" (italics added) (p. 72).

The problem centered on students' oral presentations of their research projects. Each student was required to research and present a different topic. There were as many topics as there were students in the class. Oral presentations were scheduled throughout the last eight weeks of the semester. I introduced class projects over three years ago and had refined the structure to a certain point. However, after more than six semesters of teaching this course, I was stumbling in my efforts to accomplish other specific tasks that I felt would optimize the learning of students. Specifically, students were taking too much time with their oral presentations, and I had insufficient time to lecture and integrate. Although I limited their time to what I thought was reasonable to adequately present their research, presentations were followed by student-to-student and student-to-teacher interactions. Adding to my dilemma was the realization that their discussions were both cogent and challenging. For example, "real world" issues such as ethnic considerations were addressed by students of represented cultures. This exchange was an adjunct that I did not want to give up.

I was stonewalled. And then I learned about classroom assessment in the broad sense of the word. In other words, classroom assessment was more than giving tests, reading papers, and perusing student evaluations. I decided to invite students to become involved. I presented my dilemma to them and asked if they would be interested in helping me design a more effective way to accomplish my goals. They overwhelmingly responded that they would welcome the opportunity. Their assent caused two major happenings. First, it forced me to delineate my goals in order to provide students with parameters within which to work. Second, students found themselves invested in the process and committed to helping me find a solution. In essence, we were both strongly invested.

Recommendations for restructuring this part of the course are now in the hands of the students. They are excited about the opportunity to summarize how they would organize the projects and presentations. At least 75% of the students in this class plan to attend graduate school. Some will choose to become teachers. I hope that the positive experience they had this semester will be remembered and that tomorrow's teachers will realize the benefit of *classroom assessment*, *personal investment*, and *active involvement*.

Reference

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TEACHING METAPHOR: TEACHER AS AN OPTOMETRIST

To me, the teacher is like an optometrist. Each technique and each perspective which the teacher brings to her/his students is a lens which focuses the subject matter for them in a particular way. Looking first through one lens, then through another and yet another, the student comes to understand that there are many diverse ways of knowing and that different situations call for different approaches. The teacher can enable this learning process by carefully selecting the exact lenses which are most appropriate for the subject matter, by painstakingly matching these lenses with each individual student's needs and capabilities, and by sequencing the presentation of these lenses so as to develop each student's individual powers of understanding to the maximal extent. In order to do this rightly, the teacher needs to acquire, maintain, and continuously upgrade her/his professional equipment (scholarly and pedagogic expertise). S/he must also take care to so manage the lighting and positioning in the examining room (psychological and social atmosphere in the classroom) that it provides a truly focusing environment. If the instructional process is completely effective, the students will learn to be their own optometrists, and the teacher will receive new lenses from them.

TEACHING STRATEGIES

One of the most interesting and heartening experiences I have had as a teacher is a direct result of my involvement with Project Teach. Last year Project Teach introduced me to the names and specific characteristics of different styles. This term I used this knowledge to diagnose and correct a potentially devastating problem in one of my courses, English 433: Children's Literature. The problem was that the students in this course were determinedly passive learners. The habit of passivity had been thoroughly ingrained in them (this is a senior level course) and was intensified by their virtually unanimous, apparently unshakeable assumption that our subject matter required nothing else. Although most of them would momentarily engage in active learning during a particular assignment, habit and assumption prevented them from sustaining that inner activity or even recognizing what they had actually done. And so, following the advice of my Project Teach colleagues to make the whole learning process as conscious as possible for the student, I described passive learning to my class, contrasted it with the tremendous developmental activity experienced by the child, and suggested that each college student, too, is on a developmental path from the dependence and the passivity which might be appropriate for the freshman to the cooperative and collaborative learning of upper division and eventually to the independent learning capability we need once we graduate. This whole discussion, including their comments and questions, took only about fifteen minutes, but it utterly revolutionized the class. For each of them, as for me, just learning about different learning styles was amazingly liberating and empowering. Each of them, even the ones I had privately considered thoroughly dependent learners, immediately and spontaneously identified with cooperative and collaborative learning. One measure of how responsible and activist they now are is that on May Day, when the Rodney King riots were only a few hours old, this class was already hard at work on an assignment they had instantly given themselves: devising specific practical ways of using children's literature to help any child who had been touched by those riots. To tell the truth, this formerly passive class has now become so active that I may not be able to keep up with them.

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TEACHING METAPHOR:
TEACHER AS MANY THINGS

Metaphors are often like cheap shoes--they look good at first, but they never really fit. "All metaphors leak" is the way someone else puts it. So I'm distrustful of metaphors, which, as stale cliches, deaden us to original thought. Even when they are fresh and original, metaphors often so dazzle us with one or two perceptive parallels that we are blinded to the real nature of what is being described through implied comparison.

What is a teacher like? Metaphorically, a teacher is sometimes a used car salesman, enthusiastically, cleverly (sometimes even honestly) working to sell as almost new what are, in fact, usually well worn ideas to students who are often reluctant buyers at best. If the teacher/sales person were to reveal to the student/buyer everything that might be wrong with the conceptual used car, the often skeptical customer might well refuse the proffered intellectual deal altogether. Unfortunately, used car salesmen usually rank at the bottom on occupational prestige scales. Most teachers would reject the comparison.

What is a teacher like? Metaphorically, a teacher is sometimes a conscientious ecologist, carefully culling and recycling old ideas, useful skills, retellable stories that time and repeated critiques have proven to be nonbiodegradable, and thus lasting, worth keeping and teaching, often in reconstituted form, again and again.

But does the production of brand new ideas, rather than the recycling of old ones, pollute anything? Is there a finite supply of the raw materials of which ideas are made? Another leaky metaphor.

Perhaps a teacher is a gardener, cultivating a diverse plot of student/plants, each one unique, each one capable of producing never-before-seen flowers and fruits of exotic splendor. Unlike the salesman and ecologist metaphors, at least the gardener image doesn't relegate students to the passive recipient role so favored by traditionalist teachers, but, even so, there is the problem of the gardener's spreading of manure to encourage healthy growth. Professors have been accused of dispensing b.s., but we always try to refute the charge.

No, I do not believe metaphors are very useful for understanding what teaching is all about. In fact, by remaining alert to the conceptually limiting nature of metaphors, and by using them very sparingly, we can perhaps avoid the traps inherent in metaphorical thinking about our roles in and out of the classroom.

TEACHING STRATEGIES

Ungraded student writing, including freewriting, journals, and other "speculative" kinds of writing, offers an effective means of stimulating active student involvement in learning. In addition, it enables instructors to break up long lectures, conduct meaningful assessment of student learning *in medias res*, and structure cooperative and collaborative learning. Because they are ungraded, such writing assignments do not add impossible burdens to an instructor's work load.

One form of ungraded writing that I have found particularly useful in getting students actively involved in reading and thinking critically about class assignments is what I call the "response paper." These short writing assignments (1-2 paragraphs--never more than one page) accompany most of the reading assignments in the classes I have recently taught. They can be hand written, impromptu and revision is not necessary.

To get students started with readings and as part of the "prewriting" phase of the assignment, I often prepare a "preview sheet" with questions or guidelines to help them find a point of view for responding to the assigned reading, but, in any case, students may depart from my suggestions and develop their own ideas if they want to. I try to design the guidelines and questions that precede readings in order to help students relate the course content to their everyday lives, to get them to question the generalizations made by the writer (or by me), and to urge them to respond to readings in a personal, individual way.

Students seem to produce their most successful response papers when the preview sheets and the writing prompts create an imaginary situation in which they have a role and a purpose in relation to a specific audience. For example, in a linguistics course, in response to one, fairly technical reading assignment on the acquisition of language, I asked students to pretend that they were consultant linguists hired to speak to an elementary school PTA group of parents and teachers about how children acquire language in an orderly, rule-governed way, and then to respond to any one of several questions supposedly asked by audience members.

I also use response paper assignments in the midst of class to rouse students from passivity and motivate them to think actively about course content. In the same course, students watched a videotape entitled "American Tongues." At one point, a Yale alumna being interviewed on camera tells about how she became physically repulsed by her former fiance when, as they drove from New England toward his home in Georgia for the first time, his accent became more and more "Southern." By the time they got to Sparta, she recalled, "I had had it." I just knew that someone with those little accents was not going to crawl around inside of me. I was not going to have little southern babies who talked like that." She got a plane home. I stopped the video and asked the students to write for five minutes about what might have accounted for her strong response, and then we discussed their hypotheses.

Because students turn in a considerable number of these response paper assignments, I insist that we observe certain policies:

--When a response paper is to be written outside of class, I collect it at the beginning of class and not afterwards. I do not accept late responses or work written during the class discussion.

--If students know they will be absent, they are requested to make arrangements with me in advance so that they can turn in the assignment early.

--When response paper assignments are to be written during the class period, I allow no makeup.

At home, I quickly read each response paper and usually write a brief comment and return them quickly.

My response paper writing assignments are not, strictly speaking, ungraded because I discovered that students will often simply not do completely ungraded out-of-class assignments. Therefore, I attach a small amount of credit to each response paper. As "grades," each paper receives a check (usually), a check plus (for exceptionally thoughtful responses), or a check minus (for excessively thoughtless or careless responses). At the end of the semester, I assign a numerical score to each paper by dividing the total number of points allotted to response papers by the number of papers assigned. In a recent semester, for example, twenty response papers were allotted a total of 100 points, or five points each, out of a total of 500 possible points for the course as a whole. Papers with a check plus received six points; those with check minus received three. Thus each paper that earned a check was responsible for five of 500 points, or 1% of the final grade. That tiny amount of "credit" seems to motivate a very high degree of participation without misdirecting my students' focus to "working for a grade"; in cases of missed papers, if the quality of a student's response papers is generally satisfactory, a couple of zeros do not do much damage.

Response paper assignments and the preview sheets that usually accompany them are challenging and fun for me to create. I can read and briefly respond to forty response papers in a little more than an hour. Best of all, my students do virtually all of their reading assignments on time, come to class having thought about the reading, and are ready to participate actively in discussion.

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TEACHING METAPHOR: TEACHER AS A SOWER OF SEEDS

According to Webster's first meaning of the term, a sower plants seed for growth by scattering. A teacher scatters seeds of knowledge with the intent of seeing them grow into the type of knowledge that will be beneficial to the individual student and his community. A teacher is like a sower of seeds of knowledge in the field of classroom students.

One who sows seeds knows how complex this process is from the beginning to the end. The growing process is like the learning process. It is dependent on so many factors: the quality of the soil, the climate, the timing of specific supporting inputs; the quality of the seed; and the nature of the surrounding environment.

Like the sower of seed bent from hard labor, teaching is demanding work, and there is frequently no immediate reward in terms of a fruitful harvest. Some seeds will not grow. Sometimes, in spite of the best efforts of the sower, the highest quality inputs, the most fertile soil the yield from specific instructional efforts is not easily discernible. A seed may lie in the ground for some time before it brings forth the type of fruit that the sower labored for so long and hard. And in some, the seed never yields fruit. The teacher, like the sower must continue his/her work.

A teacher like the sower of seed understands the importance of his/her role and efforts in the grand scheme. It is these efforts that produce sustenance for individuals and the essence of civilization. A teacher like the sower takes the responsibility for dispersing the seeds of knowledge, without any guarantees on the returns, but with a specific commitment to dispensing the knowledge of a discipline to the best of one's ability.

TEACHING STRATEGIES

Writing is the instructional strategy I employed most fruitfully in Political Science 457, a class in international political economy. This allowed students to develop further their writing skills which is always important for today's college student. More importantly, writing was used to help students learn about the political and economic forces shaping the behavior of individuals and states in the 1990's. In this instance, my aim was to encourage "composition with content".

One of my primary objectives was to help my students master the vocabulary and concepts so important for an understanding of the arguments in the field. Additionally, I hoped to introduce them to the form of writing traditionally used in presenting social scientific inquiry. My final goal was to encourage my students to use the concepts to examine critically specific issues involving the distribution of power and wealth in the international economy. The use of writing as a learning strategy allows students to build capabilities in both analysis and synthesis.

Reading is an essential part of writing as an instructional strategy. It is imperative for the students to read required material in order to write clearly and effectively. Many of the students come into my class to satisfy a writing requirement and find that they are also being challenged in terms of reading proficiency. Students are thus required to read very carefully and frequently to reread material in order to be able to discuss it in written form.

In international political economy, the normal implementation requires at least twenty pages of assigned student writing during the term. Typically, I have assigned four papers of approximately five pages. By giving the students four shorter papers, I am able to look for improvement over the term and indicate items students need to work on during the semester. I have developed a grading sheet designed to indicate specific areas and matters which concern me as I grade. Sometimes, there are matters of form, grammar, punctuation, style and spelling. In other instances, I try to focus on the need to strengthen introductions or conclusions. Perhaps my most frequent comments deal with the strength of the argument. I encourage them to think critically about the logical implications of the arguments and concepts used in the class and the reading. Encouraging students to think about ways to improve a paper in both form and content leads them to reflect on the material learned one more time, thus reinforcing the original learning. On occasion, I would give students the opportunity to earn additional credit by rewriting a paper.

Writing is a fundamental part of the research process in the social sciences. The critical questions raised, the problems defined, and the interpretations of crucial evidence are communicated through writing. In international political economy, I introduce my students to the need for them to raise questions and answer them logically with evidence drawn from the field. I frequently draw on an analogy between written arguments in the social sciences and the arguments presented by a good defense attorney. While the analogy is not perfect, it serves to illustrate to students the need for them to defend their written arguments based on facts and ideas. Political ideas and economic facts rarely speak for themselves. They need to be interpreted, explained, and communicated.

In one of my writing assignments students were asked to present an argument related to North-South trade issues. In order to present the argument, it was first necessary for them to link two given sets of concepts together coherently and logically. No definitions were allowed. Students were asked to convey their understanding of the concepts and their relationship to the broader issues of the distribution of power and wealth between the North and the South. They were advised to visualize the writing project as a large jigsaw puzzle whose eventual shape and composition would be determined as they fit the pieces (concepts) together. It was an attempt to get my students to explore the connections between items such as an external currency market, primary products, and an international debt crisis. After submitting the paper, most of the class described the assignment as either "hard" or "challenging". Several said that they had read extensively, perused their lecture notes closely, and written more than usual in order to think through and clearly establish the relationships among the items for the paper.

Using writing as a teaching/learning strategy has both positive and negative benefits. I would briefly like to identify some of the pros and cons from my own experience.

Pros

According to the second report of The Harvard Assessment Seminars (1992) students generally regard writing as an important part of effective instruction and learning. It is frequently related to the intensity of courses. The relationship between the amount of required writing in a course and students' levels of engagement (represented by either time spent on the course or intellectual challenge) is stronger than any relationship found between student engagement and any other course characteristics. (p.25) From my perspective, getting a student engaged in the subject matter of my discipline is the key to effective instruction.

Time constraints may make writing somewhat stressful for some students, but generally it is less stressful than blue book examinations. For some of my students, writing papers offered them the opportunity to achieve grades they would not have been able to achieve under the pressure of the blue book exam environment. I remember one student coming into my office in the Fall and explaining to me that she had always been a poor student and asking if she had a chance of passing my class. Without the stress of an exam, this student's diligence and hard work earned her a passing grade. At the end of the semester, she noted her own improvement in both learning and writing with pleased astonishment. According to the authorities at Harvard, many students really want to see improvement in their writing and learning abilities as a result of their work in college classes. (p.8) In many respects, this is sufficient justification for using this instructional strategy.

Cons

There are some serious drawbacks to the use of this strategy which deserve mention. For the instructor, the most significant constraint involved in using writing are the paperwork and the grading. Preparing written assignments can be quite challenging and time consuming. Grading can be a major task. Time is always a problem, but the way an assignment is graded may have a serious impact on the learning process of the student.

Reference

Light, R.J. (1992). The Harvard Assessment Seminars.

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TEACHING METAPHOR: TEACHER AS A MOTIVATOR

Back in 1978, professors were wise old scholars, full of knowledge they had acquired through years of painstaking research, and graciously willing to share some of it with us, the incoming class of freshmen. We, for our part, were eager to soak up as much of that knowledge as we could; after all, that was why we had endured the German school system, which required a battery of examinations and a fight for the requisite high school GPA to beat the cutoff for impacted colleges.

Alas, times change, and the intervening centuries have been unkind to the ideal of the professor of 1978. Today's version of the university here at CSU Fullerton is a suburban commuter campus. Students come here emerging from a myriad of cultural and social backgrounds, seeking a degree that will get them a career, ready to spend just a few hours before disappearing again in the freeway jungle. Now it is up to me, the teacher, to get them interested in learning. I am like one of those motivational speakers you can watch on television late at night, trying to convince you that you can turn around your life. The students are my audience and, like any good motivator, I only succeed in as far as I can get them involved in my act.

My "lectures", therefore, must never degenerate into monologues but evolve as a constant give and take with my audience. Success or failure of my effort is measured not in how much I cover or whether the information on the syllabus gets across; rather, success means that the audience gets truly engaged in the discussion. Only in as far as I manage to sensitize my audience to the issues at hand can they become involved so that learning can take place.

Because my audience is so diverse, I must fine-tune my act to their individual needs. I must strive to understand and honestly respond to their diverse social and cultural perspective, for an audience that does not see itself reflected in the message of the motivator is sure to tune out. However, notwithstanding this multi-cultural approach, the motivator pursues a uniform goal, viz. to create an environment for each individual to recognize the personal relevance of learning. A good motivator makes it plain that everybody comes from a unique personal background and that each one of those backgrounds is just as valid. Most of all, however, s/he instills in them a sensitivity for the issues at hand that is common to them all. Isn't that common outlook what defines being American?

TEACHING STRATEGIES

Probably the most fundamental change that I have instituted in my courses as a result of my participation in Project Teach is the integration of short writing assignments in almost all class sessions. I use these assignments both for straightforward classroom assessment and to soothe my conscience that our students do not write nearly enough outside of a few specially designated "writing courses."

Having been involved in the teaching of composition for more than six years, first as a graduate assistant and then in my own classes, one of my major concerns has long been how rarely our students write. Certainly, I have felt the pressure to dump writing in my classes: There is only so much time available, so priorities dictate that I concentrate on the "essentials", viz. a certain bulk of content that needs to be covered, certain skills that need to be taught, etc... And, of course, all of these need to be tested without eating up all my time. While my assignments are too brief to practice essay form, at least I expect complete English sentences.

As for classroom assessment, the writing assignments make it possible for me to continuously monitor the progress of the whole class, which is something I previously found difficult to achieve even in an active class environment. My students are always involved in discussions and problem solving, but those who are less than enthusiastic about a subject know how to disappear even in a crowd of three, of course. Much of the time, class activities are therefore carried by only a subgroup of students. The writing assignments, on the other hand, involve everybody. Whether I ask the students to write their name on them (sometimes I do) or turn them in anonymously, each student participates because I collect a piece of paper from everyone.

The assignments can be quite varied. Frequently, I just ask students towards the end of a class to take three minutes to write down the "muddiest point" of my lecture or anything they would like to know more about. I try to keep this particular variation as informal as possible to remove any element that may be threatening or create anxiety on the student's part. The muddy points are always anonymous; students can write on any size or shape of paper; they can be as general or as specific as they like. The outcome of this exercise is always surprising. No matter how productive a class discussion may have been, it invariably uncovers unexpected misunderstandings or gaps in student learning. Conversely, it has happened on occasion that a particular concept that I had deemed difficult did not present much of a problem. Other variations include writing short summaries of the previous session at the beginning of a meeting, writing short definitions or explanations, discussing how they would approach a particular type of exercise or problem, etc. Naturally, the anonymous reviews are also open to critiques of my performance, and I make it a point to respond to these at the start of the following session.

The writing assignments are an invaluable aid for my class preparation as well as for my performance. At their best, I could structure the progress of a class almost entirely around the points they raised, effectively empowering the students to set the agenda for the class. This ensures that the discussion is relevant to their thinking at any time and, thus, better learning. Finally, the beauty of these short writing assignments is that they really do not take much class time for administering them nor much outside time for reading them; instead, they actually lead to a more effective use both of my preparation time and of class time.

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TEACHING METAPHOR: TEACHER AS A HERMIT

The teacher as hermit, student as novice/initiate, classroom as desert, student outcomes as personal decisions about one's relationship to chaos. The teacher is a hermit, committed to certain vows of ethics, endurance, and poverty; on a quest for knowledge, new paths of navigation through uncharted wilderness; with little to offer new students to the desert except the fire of commitment.

Teachers also organize knowledge, strengthen skills, and provide encouragement--as do bureaucrats, vocational guidance counselors, and psychologists, whose primary function is to maintain the status quo. The primary consequences of effective teaching are not maintenance and security but discovery and skepticism--the jumpstarting of minds.

This metaphor expresses my conviction that learning is a highly individualized process, often painful, and difficult to orchestrate in the artificial, constrained conditions of the classroom. A teacher can provide an example of commitment, and beyond that, a variety of techniques that surprise, stimulate, encourage, and provide opportunities to know. Different techniques are effective for different students. Over the course of a teaching career, a teacher picks up a grab-bag of techniques and uses the ones that seem appropriate for different occasions.

TEACHING STRATEGIES

Because I view learning and teaching as rather idiosyncratic processes, I have been slow to add collaborative techniques to the teaching grab-bag. The following collaborative method is one that I tried this semester (Spring 1992) for Anthropology 300 (Language and Culture):
One of three classroom assignments, as described in the syllabus:

Class presentation and one page synopsis April 20-May 22 (50 points)
At the beginning of the semester, you will be assigned to permanent work groups; there will be about five people to a group. The five of you must decide on a topic related to language and culture that you would like to explore (for example, language and gender [do men and women speak the same language?]; language and nationalism [how to different groups use language as a way of defining their identity?]; styles of telling jokes or stories in different cultures; the linguistic features of glossolalia or speaking in tongues). See the attached bibliography; also, I have papers and books in my office that you are welcome to look at and borrow.

Although you will work together as a group to decide on a common topic, you will each read separate articles or books for which you will prepare a one page synopsis. This one page synopsis must be duplicated for distribution to the rest of the class on the first day of your group's in-class presentation. Your group will have two days to give a creative presentation of your topic to the class.

Example: Your group has decided to focus on language and gender. You arrive at this decision after several brief in-class discussions, and during telephone conversations in which you exchange information about articles available in Dr. Parman's office or stumbled across in the library. On or before March 13, turn in a paper your group has chosen, and the specific articles or books to be done by particular people. For example, Person A may be reading an article about bartender-waitress interaction in a bar; Person B may be reading about the "Doctor Nurse Game"; and so on.

You will then be assigned two days during which your group's task will be to educate the rest of the class about language and gender. You will start off your two days by handing out to the class a copy of each of the five separate synopses. The one-page, typed sheet should include the following information:

a. Your name, class name, and semester;
b. The complete bibliographic reference to the study;
c. The purpose of the study;
d. Subtopics (i.e., a brief outline of the major points made by the article);
e. Interesting Ideas contained in the article (specific bits of information);
f. Tentative topic of your class presentation--how you are going to illustrate your article, or develop it with specific examples, demonstrations;
g. Suggested readings: additional readings that you think would help your fellow students learn more about the subject matter.

What happens next? The least imaginative possibility is for each individual to present his or her paper separately during the allotted time. But I would prefer that you explore alternative ways of teaching the class about your topic. For example, the group could enact a bar scene in which waitresses and bartenders demonstrate a variety of speech acts such as rituals of masculinity, dominance displays, ritual reversals, and drinking contests (or, another example could be found from a different culture--for example, drinking in a bar compared the rules surrounding the drinking of Kung-Fu tea); and then switch to a scene demonstrating a cocktail party in which "men's language and women's language is demonstrated. Your group may do a videotape. You may dissect brains to talk about language and biology. You may organize a debate. The sky is the limit--just remember you are the teachers, and you have two 50 minute periods to convey, in as a creative way as you can develop, the essence of your insights about your topic.

To receive 50 points for this assignment, you must follow the assigned outline, hand in the one page synopsis at the assigned time, and participate in the in-class presentation.

What is my evaluation of this technique? The first group presented its topic (non-human communication) this week, and I was impressed by the positive aspects of this method. They had been in touch with each other, helped each other decide on reading material and topics, and had a sense of group solidarity that was noticeable in the classroom. There were six members of the group; each did a separate synopsis of the reading material; and each did a different kind of presentation that led smoothly, one to another, like pieces of a jigsaw puzzle. The first person spoke on the organization of the human brain in comparison with non-human primate brains; the second person on complex communication systems in non-humans (cats, dogs, birds, elephants, honey bees); the third person on the difference between language and body/gestural communication of non-human primates; the fourth person on developmental differences between human and non-human primates; the fifth person on whether the sign language of Koko the gorilla qualifies as symbolic communication; and the sixth person on attempts to communicate with dolphins. They used videotaped snippets from films on gorillas and dolphins to illustrate various points.

The students felt more secure in performing in front of the class, and more confident about the assignment--one result being that they ended up reading much more than what they could have gotten away with for the assignment. The rest of the class got, from the first group alone, six one-page synopses that could provide the core of a research project or paper for a class in the future.

On the negative side, I think some groups have not worked very well, and I expect that their presentations will be disorganized and unrelated to each other, the participants annoyed and defensive. In this event, the fragile solidarity generated in the class will probably collapse, the class will feel uncomfortable, and all I will be able to do is remind them that they bear the responsibility to the ideas to which they have been exposed during the semester.

Sic transit, and on to the next column of stone.

HEPING ZHAO

Assistant Professor of English 1990

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TEACHING METAPHOR: TEACHER AS A DINNER PARTY HOST/COOK

Vernon L. Taylor compares a bad class to "the restaurant on the moon: good food but poor atmosphere." I like this metaphor but would like to move the restaurant to the earth where the atmosphere can be good. To me what goes on in a class is like a lively dinner party, the teacher being the hosting cook and the students the diners.

Few things give me as much pleasure as does eating. When I was a student, I always likened a good class that I truly enjoyed to a voluptuous meal, one that not only satisfied my hunger of the moment, but afforded a beautiful memory for a long time to come. Since I became a teacher, such wonderful meals, although few and far between have become the goal of my teaching. Just as there is nothing more gratifying for a dinner party host/cook than to see his guests and family eat happily and abundantly, enjoying every course and every bite of the meal, there is nothing more pleasing to me as a teacher than to put together a class that is lively, with all students actively participating and learning as much as their individual talents and training permit them.

Like the hosting cook, the teacher must spend a tremendous amount of time on his own training in general and on the preparation of each class in particular. He has to have a clear understanding of the material to be taught and know how his students can relate to the subject, just as the hosting cook knows about food in conjunction to the dietary needs and preferences of the diners. During the course of the dinner party, the host facilitates conversation, soliciting comments about the food served from the diners as knowledgeable participants in the event of eating. Similarly, the teacher facilitates the meaning-making process in class, sometimes as a guide and sometimes as a participant, but certainly not as the absolute source of authority. Some students attending this "dinner-party" class may find certain ingredients not to their taste. Others may feel the way the food is prepared has either enhanced the flavor or spoiled it. Still others may think the food tasteful but may actually have a hard time digesting it. Overall, though, a good dinner party should make everyone gratified, looking forward to the next one as they leave. As a teacher, I consider it a success if my students are fully engaged and actively involved in the process of learning, as are the diners at the party, and if they leave the class feeling that they can not wait until the next meeting.

TEACHING STRATEGIES

I teach a number of multiple subjects waiver courses as my routine assignments. Among them are the various levels of college composition and grammar. I tried in both kinds of classes to apply some of the teaching strategies and methods we have discussed at the Project Teach meetings. Specifically, I revised my requirements for journal writing in the writing classes and initiated classroom assessment in my grammar class. Although still at a stage of experiment, some implementations worked well.

I have used journal writing as a required assignment for my writing classes since I started teaching composition several years ago. Typically students would be required to write three or four entries each week on anything that they found interesting. I would collect their journals three times during the course of the semester, count the number of entries, and assign each student a grade to be incorporated on their final grade for the course. First, since students had absolute freedom in the choice of subject matter, their entries soon became totally unrelated to the course. And this lack of direct connection except in grading between journal writing and other assignments led to a drop of attention and interest on the part of many students. The length of their entries became shorter, the content drier and more contrived, and the format sloppier. In the end, they would actually procrastinate and do all the entries the night before the journal was due for collection, except for a few students who carried on this assignment diligently either because they really wanted a good grade or because they had kept journals on their own and found them beneficial.

Project Teach provided me an opportunity to evaluate the way I used journal writing in my composition classes, which resulted in some substantial revision of this assignment. Using "focussed freewriting" and "expressive writing," I redesigned the journal writing assignment so that all of the entries would be tied to the course objectives. Among other things, I increased the number of entries for each week from three to five; but at least two of these entries would be done in class. I also collected, read, and responded to their entries more frequently. Each student was required to have two journal books and should turn in one of them every three weeks. The increased communication between them and me through their journals and my comments made it possible to address some of their concerns and problems on a timely basis thus tying journal writing as an dynamic part to the whole course.

In English 106, ESL Writing, that I am teaching this semester one of the two in-class entries occurs in the beginning of a class meeting for students to recollect the information they have read for that day. I find this entry beneficial particularly for a class which meets only once a week. The students may have read the material four or six days ago. Writing the journal entry helps them recall the information. The second entry is usually done in the second half of the meeting, sometime after a discussion of some major concepts, other times before a specific project. A few weeks ago, several students from the class took the EWP test and felt they did not do well even though the topic for the test was familiar to them. Using their concern as a prompt, I asked the students to write in their journal what, in their perception, was a good essay done in the EWP context. Afterwards, I distributed to the class the EWP information booklet provided by the University Testing Center and analyzed some samples of both successful and unsuccessful essays. Then I asked them to write another entry to summarize from the Testing Center's point of view, what constituted a good EWP essay. Doing them twice, with some discussion and analysis of samples in between, helped them see better concepts such as thesis statement, support, topic sentence, organization and so on that are fundamental in English composition.

Another teaching/learning strategy that I have implemented is classroom assessment. I had thought of doing something to evaluate how effectively I was teaching and how well my students were learning in English 303, Structure of Modern English, a lecture class required of many majors across liberal studies, humanities, social sciences and teaching credential programs. In the past, my knowledge of how students were handling the material was based on a few homework assignments, two one-hour tests, and a final. The limitation of content in measurements and the long interval between them offered me little useful information about the students' learning and my teaching.

The purpose of using classroom assessments centered around the course objectives of enabling students to realize the complexity and richness of the English language and the way this language works within certain sets of rules, the assessment was to help me find out, on the one hand, how effectively I, the instructor, was teaching the material and, on the other, how well the students were learning it. Since it was the first time I tried classroom assessment, I made sure not to ask students questions that were too complicated for them to answer and for me to explain. I instead made the questions fairly simple, content-oriented, and straightforward. Typically, at the end of each chapter, I would hand out to the students a sheet of paper. They would usually be asked whether they understood the concepts in the summary or any other concepts in the chapters, their relationships, and relevant examples. They would also be asked what they thought were the most difficult points in the chapter. Occasionally, they might be asked what to them was an effective way to learn certain parts of the chapter. The assessment was anonymous and it was OK if students chose not to write anything or had nothing to say. Usually they would be asked to do the assessment either before the mid-way break for my three-hour class or the last five minutes for the seventy-five minute class. I would collect the answers, read and classify them, and respond to them in the beginning of the next (portion of the) meeting. Although simple and fast, these assessments have already proven to be working. A course in which students typically got B's and C's in the past now has many students poised for A's after two tests.

I am encouraged by my success, however, limited, in applying two teaching/learning strategies I learned from Project Teach: journal writing and classroom assessment. I will continue to use these strategies and implement others in order to make my teaching more effective.

GERALD GANNON

Professor of Mathematics 1973

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TEACHING METAPHOR:
TEACHER AS A BASKETBALL COACH

I'm not sure I am comfortable thinking of myself as teacher in terms of a single metaphor. I don't see myself as playing a "part" or as being the center of attention in my classroom, or as approaching every class the same way. I see my job as that of helping my students learn something, usually mathematics. I often tell them that, " It's you and me against the material." But, for the sake of argument, the closest I could come would be to think of myself, a teacher, as ***basketball coach*** . There are many things in mathematics I can't do, but I've been around enough good players that I think I know how to recognize when a student makes a "right" move. Some moves I can demonstrate. Others, I have my students demonstrate to each other. But, eventually, it is my students who must play and win the game. So I must see that they leave my class with the necessary skills and confidence. In doing so, I try to structure the learning environment so that my students will enjoy the "home court advantage". I learned the hard way very early on that a great athlete, if confused, will often make plays that resemble the efforts of a five year-old. Hence, I try not to add to the confusion that is inherent in the learning of new material. Where possible, I attempt to eliminate this confusion by using the appropriate examples or lectures culled from years of experience.

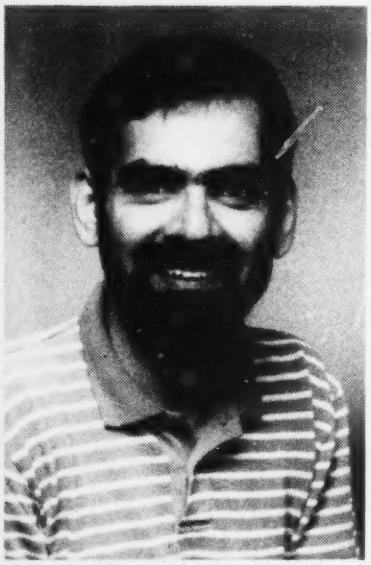
As coach I know that I must adapt my style somewhat to each team (class). Sometimes a coach will get a team that likes to run. Other times, tenacity might be their strong suit. And, every now and then, a coach will get a team blessed with height. While still stressing strong fundamentals, a coach will tailor practice so that strengths will be utilized and weaknesses allowed for. And, like a coach, sometimes I've had "winning" seasons, and boy, sometimes I've had "losing" seasons.

TEACHING STRATEGIES

My teaching schedule this semester was limited, especially in terms of classes aimed at the prospective elementary teachers. I have been working with a group of high school mathematics teachers who are pursuing the M.A. in mathematics, Teaching Option. Many of the strategies that have been discussed in Project Teach have been strategies I have actively used for many years, particularly small groups and collaborative learning. One idea I've used which was new for me was the idea of having the students keep a ***journal*** of their experiences and feelings during the semester. I have them turn in an anonymous copy to me at the middle of the semester and then again at the end. Reading them at midterm time was interesting and I am looking forward to the final copy next month. Although most of what I read came as no surprise, I was taken back somewhat by the large number of comments indicating that the students wished I would lecture **more**! They indicated that I helped them reach a point of understanding much quicker and that there were plenty of problems for them to struggle and help each other with.

In the classes I will be again teaching that impact the future elementary teacher, I plan on utilizing the short in-class assessment techniques to better keep tabs on the students' perceptions of the pace and difficulty level of the class. I may or may not alter my basic strategies at the time, but I can certainly work harder at making sure they are aware of my strategies.

In general, hanging around the faculty in Project Teach felt good because it placed me in a supportive environment. It reminded me of how important it was for me as a teacher to set the tone in my own classes so that my students would feel that they are also in a supportive environment. I need to constantly remind them that, if they put forth their fair share of effort, I'll be there for them every step of the way.



MURTADHA KHAKOO

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TEACHING METAPHOR:
TEACHER AS A WINDOW
STUDENT AS A WINDOW-WATCHER

I think of the teacher role as one of many *windows* through which the student *window-watcher* has access to universal knowledge. The student affects the window and is affected by it, the interaction being bi-directional.

The window scene exposed can be *dull* or blurred or fragmentary. This is *poor teaching.* Alternatively, the window could be *too bright*, resulting in blinding light. This is too intense and *fast teaching*, with the consequence that the student grasps little. The student may prefer this kind of teaching (be wearing *sunglasses).* The window could be adequately illuminated displaying scenes in the correct sequence.. This represents good teaching.

Trimmings (e.g. curtains) around the window attract the student.When adjusted correctly they help the student to concentrate on the scene (the instructional content). These are the *tools* used.

The student can affect the window, by action. The window could be cleaned of *blemishes* (*bad* aspects of the *teaching*) by the student. The student could choose to darken the window (*muddy* it) and thus *shut out the teacher* completely. The trimmings should enable the student to concentrate on the course material.

I take my metaphor from astronomy, where telescopes have opened dramatic windows to teach us the structure of the universe from the time of Galileo. The type of telescope (window) focuses on various aspects of the universe, e.g. radio telescopes give us information on gas clouds, red stars, whereas x-ray telescopes focus on the "hotter" parts of the universe.

TEACHING STATEGIES

The courses to which I applied the Project Teach strategies were the Physics 225A and 225C Laboratory lower division courses. These courses teach Introductory Physics for Scientists and Engineers. The 225A, B, C and associated laboratory 225AL, BL and CL courses take 3 semesters to complete. These strategies are described herein.

(1) **1 to 5-minute problems:**
This was outlined by Dr. Eric Streitberger and further by Dr. John Olmsted both of the School of Natural Science and Mathematics at CSU Fullerton. The idea is to give the students a "simple, short" problem(s) (in sequence) and to see how they solved it on paper, i.e., "Lets take out a piece of paper". Several examples of this were:

225A

(a) The simple harmonic oscillator (SHM) whose equation in one dimension is:
The short problem was to "Prove that a possible solution for this was given by:

$$X = A \cos (wt + o)$$

I could go around and check that they were differentiating properly and help them as they were working things out.
This was followed by "Now discuss what the parameters A, w, t and o mean and describe.Then I would go ahead to show numerical examples of the SHM.
(b) Momentum conservation.
Students get confused by the concepts of elastic and inelastic collisions. So I would typically gave them a short problem eg.:
Write down the equations for a mass m with an *initial (before the collision)* velocity $\underline{v}$ colliding with a mass M and initial velocity $\underline{V}$ with these masses having the *final (after the collision)* velocities $\underline{v}'$ and $\underline{V}'$ for the cases (i) Elastic (ii) Inelastic with half the kinetic energy lost during the collision. (iii) Inelastic with the two bodies sticking together after the collision. In case (iii) I further expounded that we did not need to have information on the amount of kinetic energy lost since that information was already imbedded in the phenomenon of "sticking together".
(c) The free body diagram:
We did a number of these and e.g. the Atwood machine, the inclined plane, pendulum, conical pendulum were discussed. I would draw the whole system and say "Now draw the free-body diagram for this object" followed by "Now write down the balance of forces for this free body." This repetition was very useful in giving the students a good grounding in mechanics.

225CL

(a) Generally we did quick problems in error propagation, and I would ask students to propagate errors for simple functional dependences between the measured values and the required variable. This helped enormously and forced those students who felt they did not need error analysis to actually begin to enjoy the exercises.

(b) A discussion of experimental problems. I would say, "Where are the shortcomings of this experiment and discuss the systematic error you may have" and expect the students to write a list.

Collectively, we would discuss how to remedy the situation where possible.

(2) Skeleton Outlines:

225A

I was attracted to this strategy because it ties the lectures together and forces students to keep track of where they are and were. It also forced me in preparing the outlines and teaching both sections of 225A (I did not do this for 225C Laboratory) in sequence so that the students from the different sections could collaborate with their homework, extra problems etc. outside of the lectures. I found that this was helpful to some of the students in note-taking, but mainly it helped those who liked to see where they were.

I would leave the outline on an overhead projector in the corner of the room and go ahead with the lecture after skimming through the skeleton outline. I found that the students would take down the outline and then concentrate on the lecture.

Summary:

I feel that a "Skeletal Outline" or "Quick Problems" are not the only motivators for student participation. A very big push for the students is to be able to discuss with them outside of the lectures problems that they are having with outlines, homework, concepts, etc. I found myself giving more quizzes and getting better feedback from the students in class, but those who did well were those who generally had problems and sought me out after the lectures to discuss them. There I could discuss the other exciting physics on a one-to-one level.

The exciting aspects of Project Teach is that it reinforces a systematic organization of teaching and alerts the instructor to extend more of him/herself into the student audience and force participation. The quick problems were immediately effective in doing this. This is a very simple, but strong tool to use. The skeleton outline is a little more complex and requires extended time to work. I will definitely continue to pursue both these strategies next semester and try to use skeleton outlines together with concept maps to bring about a more forced response from the students.

KAREN MESSER

Associate Professor of Mathematics 1989

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M.A., Economics, UC San Diego
Ph.D., Mathematics, UC San Diego

TEACHING METAPHOR: TEACHER AS AN HISTORIAN

My students and I are modern participants in a broad stream of mathematical culture that dates to classical antiquity. In my general education algebra class for example, I pose for them the famous epigram of Diophantus, in a form which dates to the fourth century. (Diophantus himself lived in Alexandria ca 250 a.d.) In my lower division computer science class, we discuss a proof of the irrationality of the square root of two which was discovered by the Pythagoreans about 500 b. c.. In my upper division classes, we approach modern times with Pascal in the 17th century, or Kolmolgorov who is very old but still living in Moscow. Hence I see myself as the current ephemeral purveyor of a long mathematical tradition, fascinated by and adding my bits to a centuries-old edifice.

On a more political level, at CSU Fullerton we are the gateway to high paying white collar jobs for many of our students who are immigrants, or who come from blue-collar families where mothers or fathers don't have such jobs. This is in contrast with other universities at which I have been, or where many of my professional colleagues teach. I see myself as part of a big socioeconomic mixing machine, which is a source of great personal satisfaction. On the other hand, many of our math graduates take jobs in the defense industry, so I also see myself as an unwitting cog in the military machine, which I am not so happy about!

TEACHING STRATEGIES

I write about my general education college algebra course, as this is the course most appropriate to.what we have discussed in Project Teach, and the course that most future elementary school teachers will take. My biggest goal in teaching these students is to wean them of memorizing algorithms. My second, more operational goal is to get them to work LOTS of problems, especially word problems, because that's the only way to master the material. The single most important impact I might have on these future teachers is to teach them mathematics well. When they come to us at CSUF, these students by and large view mathematics more as a set of techniques to memorize than as a logical system to puzzle over and manipulate. They hate word problems; they're not interested in science; they can't use half the buttons on their calculators; and they don't see the beauty of mathematical description of the physical world because they hate physics too! Imagine how they will teach mathematics to their own elementary school students. My guess is that these students have not had many teachers who enjoy teaching mathematics themselves.

The first priority for these students then, is to teach them the required algebra. They must have enough facility with elementary mathematics that they will be comfortable teaching it themselves. They must be confident enough of their own ability to work problems that they can entertain a puzzling question from a student, and work through a new approach, rather than presenting a single rigid algorithm for solving a problem. They must be encouraged to devise their own strategies for solving problems, because then they will really understand the solution.

As far as specific teaching tips, I don't know that I have any especially juicy ones. I try to convey my appreciation for the power of mathematics, and to give them a tiny bit of its historical setting. For example, when working a word problem ("If you drop a watermelon from a roof that's 200 feet high...") I try to generate a short discussion of the elementary physical principle behind the problem (constant acceleration due to gravity), who first discovered it (Gallileo, more or less), and who developed the mathematics to solve the problem (Newton, more or less). In a class of 35 students, someone will usually have a pretty good answer to these questions. After we have worked an example in class, I assign several similar problems as homework to be collected at the next class . In the next class I will give them a slightly different problem to work on in groups in class, and to be turned in individually for a grade. I don't allow books or notes on these, so they can't follow a rote example. Often they do end up thinking a little during these in-class exercises. This strategy seems to work fairly well. Of course on the hour exams (5 of them), they have no books, notes or group work!

As far as general teaching tips, it might not hurt to restate the obvious. I think these rather obvious points are the ways I might best improve my own teaching. The more time put into the course by the professor, the better. The more carefully thought out and carefully corrected written assignments, the better. (This is borne out by some of the literature presented by Project Teach). I think it's important to maintain a lively and interested classroom atmosphere, even if the distinguished professor is actually somewhat tired and bored. The best way to make the course interesting is to make sure that the material is interesting and relevant. And the best way to do this is to prepare the course carefully. It's important to keep the students engaged in class by asking questions, or, in a lower level class, working on problems. I think it's important that the students know each other, and be encourage to study together. In my freshman classes, I have even tried to institutionalize this, by assigning them to study groups of heterogeneous abilities. The study groups were told to exchange phone numbers, and told that they had to meet outside of class. (Several groups have held together, but I have no data to show that this has been more effective than a less formal system).

I am by no means the best teacher in the math department, and my (once again obvious) observation is that the better teachers are extremely devoted to their teaching. It's a job that takes a lot of time and work.

GISELA SPIELER

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1989

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TEACHING METAPHOR: TEACHER AS A BAND LEADER

My metaphor for teaching changes every so often as I develop and change my teaching style.

Recently I have taught a mathematics course required by all students in the multiple subject waiver program. This class covers elementary and secondary mathematics from the first to the tenth grade within two semesters. When going into this class, the professor's assumption is that the material is already known to the students and the job consists of putting a structure around this knowledge. This leads to my metaphor. Many times I see myself as the leader of a band. Every student is a member of the band, with a special talent. And all these talents are different. Some students play very well, while others have a hard time with the basic handling of their instrument. And then there are those who have practiced every now and then, but are a little shaky when it comes to the performance. As the conductor my role has as many different aspects as there are students in my class. For one I have to keep the good players in high spirits and challenge their abilities. I encourage them to share some of their abilities with the rest of the orchestra. Then, I have to set aside a special time to assist and to encourage the weak players. They want to give up, each time they produce a sound that does not quite harmonize with the sounds they hear form the rest of the orchestra. I have to give each and every one the confidence that they too will be able to produce good music. And then I have to turn to the players who just need to be reminded that practice makes it so much easier to perform on the day of the final, and on any day they may have to use their instrument. I have the rewarding job to help every single instrument to resound with confidence and take part in the concert of the whole orchestra.

TEACHING STRATEGIES

The class that I am teaching covers concepts of elementary mathematics for grades 1 through 10. As a required course in the multiple subject waiver program, it is designed to put a structure around the mathematical knowledge that the students acquired in elementary and high school. The material is supposed to be known to the students; however, in reality, the different topics in mathematics are overwhelming for many students. Further difficulties and stress are created by preconceived notions about mathematics in general. All of this makes it a challenge to teach this class. Many students are convinced that they will have to struggle. This fact creates high anxiety. Having to maintaining a high grade point average only adds to the pressure. Aside from teaching the subject, one of my main goals is to lower the anxiety level, to make the students feel more at ease, and to let them find out that they too can do mathematics. My teaching philosophy is based on a remark by Makiguchi, a Japanese educator. Transfer of knowledge, according to Makiguchi, is not and can never be the purpose of education. The purpose of education is, rather, to guide the learning process and to put the responsibility for learning into the student's own hands.

To achieve this I have used many activities where students work with their peers. Compared to being asked for an answer in front of the whole class, the small group of friends creates no pressure of having to come up with the right answer immediately. One major strategy that I have implemented into my lectures is working in groups on special problem sets. A group consists of at most four students. The students pick their own teams which makes it comfortable for them. Immediately after introducing a new concept, the class has the opportunity to apply the material in problems solving. All students are involved in hands on activities at the same time. Another great advantage is the fact that the classroom becomes a tutoring center. The better students are coaching the weaker students. My students have said that it helps to see a peer do the problem and explain his/her thoughts at a certain approach. While the class is working, I am going from group to group monitoring success and failure, giving hints and encouragement. The students are much less intimidated asking questions in this environment. Many form their own study groups outside the class, after realizing how valuable teamwork is. After an appropriate amount of time I go over the problems so that everyone has the correct solutions. This can be done quickly since by now everyone has an idea about the solutions. Many students remark that the group problems help very much for the understanding of the material. At the same time these activities create a harmonious atmosphere in the classroom where everyone is working together instead of competing against each other.

Another tool that I use to improve performance by reducing anxiety are team quizzes. These quizzes only count for a small percentage of the total course grade. The students have the option of working alone or with a partner. Students who work with a partner hand in a combined solution. Some prefer to work alone. Upon questioning they do not mind the 'advantage' of others who work in teams. My main goal is to get every single student to realize that he or she has potential in any subject and that this potential can be brought out through hard work and a never give up spirit.

ERIC STREITBERGER

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Ph.D., Science Education, Oregon State University

TEACHING METAPHOR: TEACHER AS A GARDENER

Gardening is my metaphor for teaching. I like to work with plants and flowers in my garden as much as I like to interact with students in my classroom. My yard has many different kinds of flowers, shrubs and trees giving the appearance of a sea of undulating color. I view my students in an analogous way since they come in all sizes, shapes and colors with a variety of backgrounds, experiences and ideas. I make a special effort to relate a flower to a name; this is difficult since there are so many and I am not a biologist. In a similar manner, I call students by their names as much as I can; difficult since my general education chemistry class enrolls up to 120 students. I know almost every flower in my yard by sight just as I know my students by sight. I am delighted when I notice an obscure plant or flower grow and bloom exceptionally well. I am disappointed when I notice a plant that is not doing well or is failing. I am however, perfectly willing to apply drastic measures to save it. Similarly, I congratulate students when they are achieving well in a test, when they ask or answer good questions or when they do an outstanding job completing an assignment. I also take time to recognize students' accomplishments outside of chemistry in areas such as art, sports, music, business, etc., which I obtain from the campus newspapers and by attending student theatrical and musical productions and athletic events. I encourage, demand, cajole and remind students to see me for help if they are having problems or if I perceive them as not doing as well as they should.

Reading this metaphor reminds me of the story of the dying vintner who told his family that there was "gold in them thar hills." The family dug and churned up the hill but never found gold. But, they produced a beautiful vintage. Analogously, our students have much to offer as people and learners. By working with them in a variety of ways one should not be surprised if a bountiful harvest is produced.

TEACHING STRATEGIES

As a result of Project Teach, the learning activities below were implemented in my large (120 students), lecture-oriented, general education chemistry class for non-science majors. Student recommendations regarding the use of these learning activities are also included in this report.

1. AITSS (Auxiliary Information Test Support System)

Chemistry is one of the most abstract courses in science. First-year chemistry allegedly contains a greater number of new vocabulary words than a first-year foreign language. Typical questions from students are: "Will we have to memorize definitions, names, places, formulas, etc?" To avoid such emphasis on exams, students were allowed to write any information on one or more sheets of paper since the emphasis in class was not on rote memorization but on applying and thinking about concepts. The ultimate purpose for the AITSS was for students to organize their thoughts and the class material into a conceptual framework or scheme; and, to reduce test anxiety. In essence, the AITSS is a summary skeleton outline of the class material constructed by the students themselves. Skeleton outlines for individual chapters were provided by the instructor (particularly at the beginning of the semester) and are described below.

2. Skeleton Outlines of Chapter Material.

Outlines for chapters ranged from quite complete to very sparse. The instructional purpose was to focus on note-taking, writing skills and the review of material emphasized in lectures.

3. Worksheets to Illustrate Chemical Concepts.

19 worksheets of problems and concepts were created and assigned as homework (usually) over two or three class periods. The purpose was to amplify or personalize difficult concepts. For example: Physical and chemical changes were examined in daily life. Types of chemical bonds were related to people bonds. There were many other analogies related to life problems. The creation of the worksheets was one of the most challenging and demanding aspects for the instructor attributable to Project Teach. In general, students were asked to collaborate on the worksheets particularly in the early stages. Students usually graded each others worksheets.

4. Muddy Point Questions at the End of a Class Period.

Students were encouraged to hand in questions regarding concepts that were not clear to them, i.e. the "muddy points." This method was used to avoid anxiety expressed by some students who were not comfortable in asking questions in the large class.

5. Five-Minute Quizzes.

Short quizzes (1 to 5 points credit) were given on an average of once per week; usually at the beginning of a class. The purpose was to assess student comprehension of a topic or concept from the previous class and to provide a base for the new lecture material. Quizzes were exchanged among students for grading, discussed (in small groups or by the whole class) then returned for recording.

6. Hands-On Models Manipulation.

Pipe cleaner models of molecules were constructed by each student to deal with the difficult concepts of shapes and polarity of molecules. Using hands to melt ice in a test tube was used in a quantitative class experiment involving the Law of Conservation of Mass

7. Collaborative Learning.

Students worked together in pairs or threes to solve a common problem presented on the chalkboard or in a worksheet. Students often exchanged papers to correct each others work.

8. Student Board Work.

Students were asked to come to the chalk board to explain and show how they worked a problem. Board work usually occurred during collaborative activities or when a problem was presented to the class to enhance a particular concept. Teaching tips while working on the chalk board were also given since students had the tendency to teach to the instructor rather than focus their explanations to the class. The need for science and math teachers in public schools was usually expressed at this time.

9. Demonstrations and Stories.

Typically one to three demonstrations were given each class period to enhance the teaching of chemical concepts. Newspaper articles and personal anecdotes provided a number of stories for the purpose of personalizing chemistry in students' lives.

A Survey of Student Recommendations (%) of Classroom Activities

Directions: The intent this semester was to shift from the more passive lecture style of teaching to a more interactive style of teaching and learning. A number of activities were tried - some once, others more than once.

Please rate each activity by circling 1 to 5; (1=recommend to 5=not recommend).

		1	2	3	4	5
		recommend		neutral		not recommend
1.	The use of the AITSS (Auxiliary Information Test Support System).	86.6	11.9	1.5	0	0
2.	The use of skeleton outlines for chapters. (Used more at the beginning of the semester).	52.2	16.4	29.9	1.5	0
3.	The use of worksheets to illustrate chemical concepts. There were lots of them.	64.2	20.9	11.9	1.5	1.5

4.	To hand in at the end of class questions about concepts not understood during lecture.	26.9	26.9	37.3	3.0	6.0
5.	Five-minute quizzes for five points or less at the beginning of class to get things started.	50.7	31.3	14.9	1.5	1.5
6.	Hands-on models such as the pipe cleaner models.	43.3	31.3	19.4	3.0	3.0
7.	Students helping one another on a problem from the board by working in pairs or small groups.	44.8	25.4	23.9	4.5	1.5
8.	Students come to the board to show how they worked a problem (and receive teaching tips from Dr. S.).	20.9	32.8	37.3	3.0	6.0
9.	Demonstrations presented by Dr. S.	72.7	13.6	10.6	1.5	1.5

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TEACHING METAPHOR: TEACHER AS A CYCLING COACH

Education is like the Tour de France, the longest bicycle tour in the world. It is a race divided into numerous stages run over the course of three weeks, and is simply the most grueling test of endurance for a cyclist. It is also run through some of the most scenic mountain ranges in the world – the Alps and the Pyrenees.

The tour consists of many different stages. A cyclist must complete each and every stage in order to complete the Tour. Competitors drop out at various stages along the way for various reasons.

The *students* are riders in this Tour. They have mounted their bikes bent on finishing each stage as best they can. These stages are like different years in school. Their bicycles, their equipment, are a crucial part of their success or failure. The interactions of the various components of the bicycle are like the interactions between the components of the students' lives – desires, commitments, family support, etc. The *teacher* is both the support team for the rider and the mechanic for the bicycles. The teacher must continually supply support for the riders in the form of nutrition (knowledge) and take care of their health and well-being. The mechanic prepares the bicycles so that they will function properly, and must understand each rider's individual needs. The *classroom* is the course that the students will ride. Some are very challenging; some less so. Some include mountains; some are basically flat. The *student outcomes* are gauged by how far they have ridden. To complete the Tour is a major achievement. To fail to complete the Tour may not be a disaster if there have been achievements along the way – a foundation on which to improve given another chance to ride.

TEACHING STRATEGIES

I have been in a different situation from most of my fellow Project Teach participants in that I have not been teaching in a waiver class this past semester. It has therefore given me a real opportunity to concentrate on what I plan to do.

The particular waiver class that I have taught and that I will teach again in Fall 1992 is Biology 101: Elements of Biology. It is an intriguing challenge of my teaching abilities. I have questioned how I could more effectively teach a course of 125 students, many of whom are taking the course only because it is required.

I feel that the way the course is structured, it is easy for the instructors to visualize the whole picture. I think that it is much more difficult for the students to do the same. We start with an introduction to scientific reasoning and then move into biological chemistry. Often, students are lost at this early stage since they are not only forced to learn difficult chemical concepts but it is also unclear to many how this relates to biology. Since I am a visual learner, I was searching for a way to allow my students to visualize the overall picture as I do. Concept maps appear to be an ideal solution.

I will implement the use of concept maps throughout the course to emphasize individual concepts. However, I feel that the real utility of the maps is to provide a road map for the entire course. I will therefore introduce my large concept map for the entire course at the very beginning. Throughout the course, as we move into different areas of discussion, I will reintroduce the original concept map, this time highlighting the particular area of emphasis and its interrelation with the previous and future topics. Biology is a unified science to me. With the use of concept maps, I will convey that unity to my students as well.

I anticipate several benefits from this approach. It will help those of my students who are visual learners without hindering those who are not. It will provide a better understanding of the organization of biology. It will serve as a graphic contract between my students and myself as to what and when we will cover material. This will increase the rapport that I am able to develop with students. Finally, concept maps will hopefully reduce the frequency and repetitions of the question "What does this have to do with biology anyway?"

Cover Design
by
Donna Padgett

The magnifying glass was used as a symbol to indicate that the teaching profession as well as education are under constant public scrutiny. May the glass be lifted to reveal the dedication and hard work of those people who have made education their career choice and are making a difference in people's lives.

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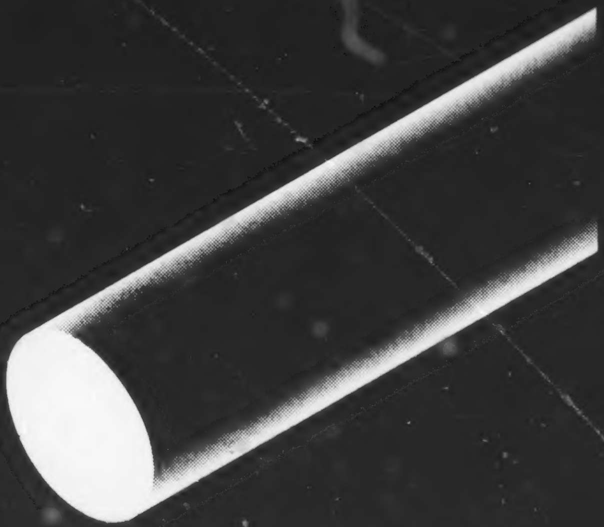

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